RA. 1217
H.F. COMMUNICATIONS RECEIVER

VOLUME 2

MAINTENANCE MANUAL

RACAL

RACAL–BCC LIMITED

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DANGER LETHAL VOLTAGES

Although every reasonable precaution has been observed in design to safeguard operating personnel this warning is ...

VITAL !

ADJUSTMENTS

EXERCISE GREAT CARE

DO NOT ADJUST ALONE

If possible, when making adjustments, ensure the presence of another person capable of rendering aid.

SERVICING

SWITCH OFF

DO NOT TAMPER WITH INTERLOCKS

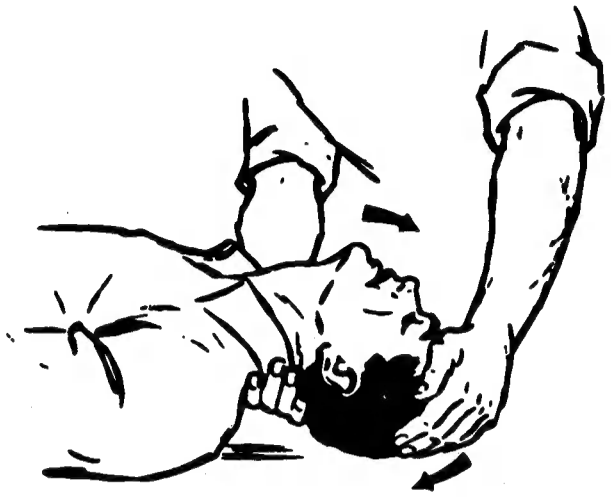
Only authorised personnel should be allowed to remove or neutralise the effect of interlocks. Do not rely on interlock switches for protection.

DO NOT SERVICE ALONE

If possible, when servicing, ensure the presence of another person capable of rendering aid.

SEE OVER FOR RESUSCITATION INSTRUCTIONS

FIRST AID in case of Electric Shock



1. Lay victim on his back.
2. Clear victim's mouth and throat.
3. Tilt victim's head back as far as possible and raise his head.
4. Pinch victim's nostrils.
5. Take a deep breath.
6. Cover the victim's mouth with yours and blow, watching his chest rise.
   Note: Blow forcefully into adults, but gently into children.
7. Move your face away to allow victim to breathe out, watching his chest fall.
8. Repeat first five to ten breaths at a rapid rate; thereafter, take one breath every three to five seconds.
9. Keep victim's head back as far as possible all the time.

Have someone else send for a Doctor

Keep patient warm and loosen his clothing

DO NOT Give liquids until patient is conscious

HANDBOOK CHANGE INFORMATION

The Racal policy is one of continuous improvement. Due to printing and despatch requirements it may not be possible to incorporate immediately circuit and component changes into the printed handbooks. Consequently your handbook may contain change information which will be included at the back of the books.

On receiving this handbook the user should check whether change information is included and make any necessary hand-corrections or additions to the handbook as requested in the change sheets.

Change sheet numbers run consecutively through all issues of the handbook. Whenever change information is incorporated in a handbook during reprinting, the earlier change sheet numbers may no longer be relevant and these change sheets will not be included in the book.

NOTES

RA.1217 Transistorised H.F. Communications Receiver

RA. 1217 MAINTENANCE MANUAL

CONTENTS

Illustrations (See next Page)

ILLUSTRATIONS

TECHNICAL SPECIFICATION

Frequency Range: 1 to 30 MHz.

Modes of Reception: SSB (USB OR LSB) DSB, MCW, CW.

Tuning: Digital presentation in kilohertz with interpolation calibration at 200 Hz. intervals.

Calibration Accuracy: Better than ± 1 kHz referred to nearest 100 kHz calibration point.

Calibration: A 100 kHz signal, derived from a 1 MHz crystal oscillator provides check points at 100 kHz intervals.

Frequency Stability: After 2 hours from switch-on:
± 50 Hz. over an eight hour period at constant ambient temperature and humidity.

Antenna Input: Nominal 75 ohms impedances unbalanced into a wideband circuit, or tuned in five bands.

(i) 1 to 2 MHz.
(ii) 2 to 4 MHz.
(iii) 4 to 8 MHz.
(iv) 8 to 16 MHz.
(v) 16 to 30 MHz.

Sensitivity: With tuned antenna input, and measured in a 3 kHz bandwidth, sensitivity figures are typically

CW/SSB. 1 microvolt (e.m.f.) for 15dB signal-to-noise ratio.

MCW/DSB. (30% modulated at 400 Hz). 3 microvolts (e.m.f.) for 15dB signal-to-noise ratio.

Selectivity: Three I.F. filters are fitted as standard but two additional filters may be fitted at customer's option. Nominal bandwidths are:

Selectivity (Cont'd):

Filters: (3dB Bandwidth)

Standard Filters:	Additional Filters Available:
8 kHz.	13 kHz
3 kHz.	6.5 kHz
200 Hz.	1.2 kHz
	500 Hz.

Cross Modulation:
(Tuned Input Mode)

For a wanted signal level up to 1 mV and with appropriate use of the antenna attenuator, an interfering signal, 20 kHz removed and modulated 30%, at a level of 45dB above that of the wanted signal will in general produce cross modulation of less than 3%

Intermodulation:
(Tuned Input Mode)

To produce an equivalent 1 μV input, the level of two equal unwanted signals greater than 10% removed from the wanted frequency must be at least 80 dB above 1 μV in the tuned input mode.

Blocking:
(Tuned Input Mode)

For levels of wanted signal up to 1 mV, and with appropriate use of the antenna attenuator, an interfering signal 20 kHz removed, will be 56dB above the level of the wanted signal to reduce its output by 3dB. The ratio of wanted to unwanted signal level is improved at the rate of approximately 2dB/1% up to 10% off tune in the tuned input mode.

Spurious Response
to External Signals:
(Tuned Input Mode)

To produce a response equivalent to 1 μV signal, an external signal less than 10% off tune must in general, be greater than 60dB above 1 μV.

Spurious Responses
Internally Generated:

Not greater than 3dB above noise level in a 3 kHz bandwidth.

Noise factor:

Typically 10dB in tuned input mode.

I.F. Outputs:

(a) 1.6 MHz: 100 mV (nominal) at high impedance (10 kΩ).

(b) 100 kHz: 270 mV (nominal) across 75Ω.

or

(c) 455 kHz: 220mV (nominal) across 50Ω.

Automatic Gain Control:

(a) Time constants (nominal):

	Charge	Discharge
Short	10 mS	20 mS
Medium	50 mS	250 mS
Long	50 mS	4 S

(b) Output change:

An increase in input of 85dB above 2 microvolts will produce a change in output level of less than 4 dB.

B. F. O:

(a) Variable: ± 3 kHz centred on +6, +3, 0, -3 and -6kHz with respect to i. f. centre frequency.

(b) Fixed: ± 1. 5 kHz (USB/LSB) crystal controlled.

A. F. Output:

(a) Headphone jack on front panel: 10 m W nominal in 600Ω.

(b) 10 m W in 600Ω at rear terminals. An alternative version providing one watt into 15 ohms for an external loudspeaker is available to special order.

(c) 1 m W in 600Ω 'line' outlet. The preset level is independent of the A. F. Gain control setting.

Overall A. F. Distortion: Less than 5%.

Overall A. F. Response: With a selectivity bandpass of 13 kHz the audio frequency output level from 100 Hz to 6000 Hz. will not very more than 4dB from peak response.

Meter Indication:

(a) R. F. Levels.

(b) A. F. level to line.

Controls:

(a) Meter Switch (AF level/R.F. level)
(b) Frequency Readout - In-line Digital
(c) 'Megahertz' Tuning
(d) 'Kilohertz, Tuning
(e) System Switch
(f) DET/B.F.O. Mode
(g) B.F.O. Tuning
(h) R.F./I.F. Gain
(i) A.F. Gain
(j) A.F. Line Level
(k) R.F. Tune
(l) R.F. Bandswitch
(m) Tuning Locks
(n) Dimmer (scale illumination)
(o) Calibrate - Fine Tune
(p) Bandwidth Switch
(q) R.F. Attenuator
(r) 2nd V.F.O. INT/EXT switch

External Connections:

(a) Antenna Input
(b) I.F. Outputs
(c) A.F. Line Output
(d) External L.S. Output
(e) 2nd V.F.O. Output
(f) 2nd F.V.O. Input
(g) 1 MHz Output
(h) 1 MHz Input
(i) 1.7 MHz input/output
(j) L.F. Adaptor Input
(k) Panoramic Adaptor Output
(l) A.C. Supply input

(m) - 16 volts output

(n) Diversity A.G.C.

(o) Muting Contact

(p) L.F. Adaptor h.t.

(q) L.F. Adaptor a.g.c.

Power Supplies:

Alternative power supplies may be used as follows:

(a) 100-125 or 200-250V, 45-400 Hz, a.c. single phase; or 21-27V d.c. positive earth.

(b) 9-15V or 18-30V d.c. positive or negative earth.

Power Consumption:

40VA approx. with one-watt audio amplifier or with ancillary units

Dimensions:

Height		Width		Depth
3.5 in.	x	19 in.	x	$16\frac{1}{2}$ in.
(8.9 cm)		(48.25 cm)		(41.9 cm)

Weight:

31 lb. (14.2 kg) approximately.

Environmental Conditions:

The equipment is, designed to meet certain of the requirements of specification DEF 133 L2, operating within the ambient temperature range of:

Storage	-40°C to $+70^{\circ}$C
Operation	-5°C to $+55^{\circ}$C

Construction:

The unit is of modular construction.

PREFACE

CAUTION

The RA 1217 receiver is designed to operate with a selection of ancillary units such as the I.S.B. Adaptor RA.298C & D, F.S.K. Converter RA.316C etc. It must be noted that due to power supply limitations, the 1-watt version of the RA 1217 cannot provide the -16 volt power supply required by such ancillary units.

It must be noted, that if the receiver is fitted with the one-watt amplifier, the pin E of the 12-way outlet SKT11 at the rear of the receiver should not be used for the supply of power to external equipments.

The above restriction does not apply to those RA.1217 receivers which are fitted with the 10 m W audio amplifier board.

Receivers which have serial numbers of 826 or lower, will in general, be fitted with the one-watt audio amplifier and receivers having serial numbers of 826 and higher will generally be fitted with the 10 m W amplifier, but random serial numbers may be equipped or converted to one-watt by special order, the refore the serial number is not a reliable guide.

If in doubt the audio amplifier section on the underside of the receiver should be inspected. The one-watt amplifier can be identified by the transistors VT4 and VT5 which are mounted separately from the board. (Fig. 18). Also by the components such as transformer IT1, capacitors 1C12, 1C15 and 1C17, and the resistor 1R8, which are fitted only with the one-watt amplifier.

RA.1217 MAINTENANCE MANUAL

PREFACE

Handbook Guide

This Volume contains detailed information for maintenance purposes. It is assumed that the user also has a copy of the RA.1217 Operators Manual, to which reference should be made for general information concerning installation, operation, and technical principles.

Variants

Chapters 1 to 8 of this Volume refer to the basic RA.1217 receiver. Details of any variant models will be given in appendices, which will be inserted immediately prior to the illustrations at the rear of the handbook.

CHAPTER 1

DETAILED CIRCUIT DESCRIPTION

INTRODUCTION

1. The RA. 1217 is constructed on a modular system, the separate modules themselves being composed of smaller assembly units. This type of construction lends itself to a servicing system based on replacement units and simplifies the incorporation of improved designs or special facilities. Many of the board assemblies contain further coil or transformers sub-assemblies etc., but it is strongly recommended that the user should regard the printed circuit board assembly as the smallest item suitable for unit replacement. In accordance with this principle the receiver can be dismantled into the following main items. Each principal heading indicates a module, with the printed circuit boards contained in that module listed beneath.

MODULE ASSEMBLIES

2. Units and Sub-Assemblies		Racal Part Number
R.F. Module Assembly	Fig. 4	CA.38538/A
1. Aerial Filter		AA.28188/A
2. R.F. Range Coil and Switch Assembly		CA.38539/A
3. R.F. Amplifier Board		BA.28155/B
4. H.T. Filter (not located in the R.F. Module)		AA.28179/B
1st Mixer and 40 MHz Filter Assembly	Fig. 8	BA.28211/A
1. 1st Mixer Board		BA.28215
2. 40 MHz Filter		AA.28197
2nd Mixer Assembly	Fig. 9	CA.30959/A
1. Mixer Board		BA.28177
3rd Mixer Assembly	Fig. 11	CA.35970/A
1. Mixer and Filter Board		BA.35966
1st V.F.O. Assembly	Fig. 5	CA.28120/A
1. Oscillator Board		BA.35195
2. Buffer Amp (to 1st Mixer)		BA.28128
3. Buffer Amp (to Harmonic Mixer)		BA.32535

Units and Sub-Assemblies		Racal Part Number	
2nd V.F.O. Assembly	Fig. 10	CA.28101/A	
1. Oscillator Board		BA.35808	
2. Buffer Amplifiers		BA.35807	
1 MHz Amps, Osc. and Calibrator	Fig. 6	(Part of CA.28276/B)	
1. 1 MHz Amplifier		BA.32858	)
2. Calibrator Board		BA.41745	)
37.5 MHz Generator	Fig. 7	(Part of CA.28276/B)	) **
1. H.T. Filter		BA.28284/B	)
2. Harmonic Generator Board		BA.32854	)
3.) 4.) Harmonic Filter		BA.35836	)
5. Harmonic Mixer		BA.37984	)
6. 37.5 MHz Buffer Amp.		BA.32850	)
37.5 MHz Band-Pass Filter	Fig. 7	BA.28192/A	
I.F. Module Assembly (455 kHz i.f.)	Fig. 12	DA.38580/A	
(100 kHz i.f.)		DA.38580/B	
1. I.F. Amplifier Board		BA.30533	
2. Detector Board		BA.28236	
3. A.G.C. Board		BA.31466/B	
4. Converter Oscillator Board (455 kHz)		BA.38568/A	
(100 kHz)		BA.38568/B	
5. Converter Amplifier Board (455 kHz)		BA.34783/A	
(100 kHz)		BA.34783/B	
B.F.O.	Fig. 13		
1. 600 kHz Oscillator Board		BA.30540	
2. Buffer Amplifier Board		BA.30542	
Power Unit PU.1153 (a.c./d.c.)	Fig. 15a		
1. Complete Assembly (with Component board)		CA.38640/A	
2. Component Board Assembly		BA.37549	

** The overall module (CA.28276/B) is usually referred to as the '37.5 MHz Generator' module although it also contain the 1 MHz and calibrator section.

MAIN CHASSIS GENERAL DETAILS

3. Before commencing a detailed description of each module a few points concerning the main chassis may be noted. The most suitable illustrations to refer to are the Interconnections diagrams Fig. 16 and 17. The location of modules in the main chassis is shown in Fig. 18.

H.T. DISTRIBUTION

4. The -16V h.t. supply from the Power Unit is supplied, without switching, to the 3rd Mixer, 1 MHz Oscillator, I.F. Module, B.F.O. and 2nd V.F.O. It is also fed, via the 3rd Mixer, to the Audio Amplifier and to 1SKT11-E providing an h.t. supply for ancillary units. The -16V supply to those stages prior to the 3rd Mixer, which are the R.F. Module, 1st Mixer, 2nd Mixer, 1st V.F.O. and 37.5 MHz Generator Circuit, is controlled by the System switch. The switched h.t. to these units is routed via the microswitch 1SB and the terminal block TB1 on the I.F. Module (Fig. 12) which enables the switched h.t. to be connected to an external l.f. adaptor unit, if required.

5. The microswitch 1SB connects h.t. to the terminal H.T.R.F.in all settings of the MHz tuning control except '00'. When the MHz control is turned to display '00' on the scale, a cam moves the microswitch to the opposite contact, thereby transferring the h.t. to the terminal H.T.L.F. on TB1. For operation below a frequency of 1 MHz the terminals H.T.L.F.and H.T.R.F.can be linked. This link should be removed when the Racal l.f. adaptor is connected.

System Switch 1SE

Fig. 16.

6. In the OFF position the external supply to the power unit is disconnected by the opening of the switch contacts 1SC1 and 1SC2 which are mounted on an extension of the shaft of the System switch 1SE. The function of each wafer of switch 1SE is described in the following paragraphs.

7. Wafer SE2R: This wafer controls the distribution of -16V h.t. to certain circuits as follows: In positions CHECK B.F.O. and CAL, -16V is supplied to the calibrator circuit and disconnected from the units prior to the 2nd Mixer. In the MAN and A.G.C. positions of the switch the -16V is connected to the circuits prior to the 2nd Mixer, and disconnected from the calibrator circuit.

8. Wafer SE1R: In all settings except MAN, this wafer connects the a.g.c. line to the a.g.c. amplifiers in the i.f. module. In MAN, the a.g.c. line is connected to the slider of the R.F. Gain control.

9. Wafer SE3F: This wafer provides an earth connection to the b.f.o. switch (SB1F). In the CAL position the earth is disconnected in order to disable the b.f.o. during the calibration procedure.

Main Chassis (Continued)

10. Wafer SE1F: An earth is provided only in the three a.g.c. positions of the System switch, thus completing the charge path of the appropriate time-constant capacitor in the I.F. Module. The contact 'a.g.c. short' is connected to the Bandwidth switch, in order to prevent the use of short time-constant a.g.c. whenever the Bandwidth switch is set to bandwidths of 1.2 kHz, or less.

Meter Switch

11. In the R.F. position the positive terminal of the meter is connected to the a.g.c. output from the I.F. Module and the negative terminal to earth via, 3R3 and the slider of the set-zero potentiometer 3RV4. With nil signal input and with the R.F. GAIN control set fully clockwise the a.g.c. line is at approximately 4 volts negative to earth and the meter can be set to zero by adjusting 3RV4. Any subsequent a.g.c. output then provides a meter indication of signal strength. In the A.F. position the meter is connected across the output of the rectifier bridge 3D1-3D4 and indicates the level of the 1 mW 600Ω audio line, the bridge being connected across the audio amplifier output.

Meter Zero Setting

12. The set zero potentiometer 3RV4 is mounted on a small component board located on the left hand side of the receiver. (Fig. 18). The setting procedure requires the injection of a 1 μV e.m.f. at the antenna socket, with the System switch at AGC Med. and the Meter switch at R.F. The potentiometer is then adjusted to give an 'S' Meter reading of exactly 1 microvolt.

MHz Tuning Control

13. This control rotates the variable capacitor of the 1st v.f.o. thus providing the electronic band selection described in the Operators Manual.

14. A further function of the MHz control is that when set to indicate '00' a pair of microswitches (1SA and 1SB on Fig. 16) are actuated, which disconnect the a.g.c. and h.t. from the r.f. unit, first mixer, second mixer, first v.f.o. and 37.5 MHz generator and transfers these voltages to alternative terminals on the rear panel marked H.T.L.F. and A.G.C. L.F. from which they may be connected to an l.f. adaptor unit.

KHz Tuning Control

15. This control rotates the variable capacitor of the 2nd v.f.o. and has no auxiliary functions.

R.F. Gain A.F. Gain, Line Level

16. These controls are described in the paragraphs headed 'I.F. MODULE'. The circuit connections are illustrated in Fig. 12 and Fig. 16.

Main Chassis (Continued)

Cal-Fine Tune Control 1RV3

17. Refer to the paragraphs headed '2nd V. F. O. ' and Fig. 10.

2nd V. F. O. Switch

18. Refer to the paragraph headed '2nd V. F. O. ' and Fig. 10. (Page 1.14)

Plugs and Sockets

19. Several of the modules are connected to the chassis wiring via Cannon connectors which contain both d. c. and r. f. connections. The part of the connector attached to the module is fitted with d. c. pins and coaxial sockets and is described as the plug (PL1). The mating socket (SKT) is attached to the chassis wiring and carries d. c. sockets and coaxial pins. Diagrams of these connectors are shown in Fig. 16 Interconnections.

Wiring Identification

20. In the main chassis cableform, interconnections can be traced by reference to marker sleeves for coaxial and screened wiring, and colour coding for d. c. wiring. The wire numbering for the Crystal Filter Unit is Shown in Fig. 18.

R. F. MODULE

21. The R. F. Module provides filtering, pre-tuning and amplification of the r. f. signal, with delayed a. g. c. The module consists of three assemblies through which the signal passes in sequence, referring to Fig. 4 they are:-

(a) From the Antenna input via the Muting relay contact RLA1 to the 0 to 30 MHz low-pass filter.

(b) Antenna attenuation and pre-tuning stage.

(c) The r. f. amplifier board with a. g. c.

Wiring Connections

22. Wiring connections to the module are made via pins on the side. In later versions of the module these connections are made via a 5-way connector at the forward end, with only the r. f. outlet to the 1st Mixer remaining on the side.

R. F. Module (Continued)

Antenna Input and Filter

23. The antenna is connected to the rear panel socket R. F. INPUT, thence via RLA1 and a 500 mA fuse to the antenna filter circuit. A discharge path is provided to protect the antenna circuit against excessive accumulation of static charges, and the 500 mA fuse is a protection against a heavy surge such as might occur if the receiver is inadvertently tuned through the carrier frequency of an adjacent high-powered transmitter. The muting relay RLA can be wired, via a pin on the 12-way outlet on the rear panel, to open the antenna circuit when an associated transmitter is keyed. The filter circuit 1L1, 1L2, 1L3 and 1C1 to 1C5 has a passband of 0 to 30 MHz which is designed to prevent any break-through at the 40 MHz intermediate frequency (1st i.f.) or at the image frequency (80 MHz). The filter also prevents radiation of the first v.f.o. frequency from the antenna.

Attenuator Circuit

24. The switch SB which is operated by the front panel control marked AE ATT introduces attenuation into the signal path in approximately 10 dB steps. In the minimum attenuation position of SB the switch is fully clockwise and the signal passes from 1L3 via SB2F to the switch 2SA without attenuation. As the switch is moved anti-clockwise the resistor network R4, R5 and R6 is connected, giving 10 dB attenuation. Subsequent switch settings introduce more resistance into the signal path, thereby providing attenuation levels of -20 dB, -30 dB and -40 dB. To maintain specification for measurements such as cross-modulation, intermodulation etc. at levels above 10 microvolts it is essential to use the AE ATT control.

R. F. Tuning and Range Selection

25. This circuit comprises the following:-

(a) R. F. TUNE ganged variable capacitors 2C6a and 2C6b

(b) The switched r.f. range filters 2L1 to 2L5

(c) The range switch 2SA which selects either the required range filter or the wideband (WB) path.

26. Range Selection The range selection is in octave steps, 1 to 2 MHz, 2 to 4, 4 to 8, 8 to 16 and 16 to 32 MHz. Wafer 2SA4F selects the primary and 2SA1F the secondary of the filter. Wafers 2SA3B and 2SA2B short circuit all the filters except the one in use. The signal path from the r.f. tuning selection is via 2SA1F to transistor 3VT2 on the r.f. amplifier board.

27. R. F. Tune and W. B. The ganged variable capacitors 2C6a and 2C6b provide tuning of the selected r.f. filter (2L1 to 2L5) under the control of the R. F. TUNE control on the front panel. In the WB setting of the Range switch the input signal by-passes the range

R. F. Module (Continued)

selection and r.f. tuning circuits and is fed via a 20 dB resistive attenuating network 2R1, 2R2 & 2R3 into the base of transistor 3VT2. The diodes 3D11 and 3D12 provide overload protection against excessive r.f. voltages. (up to 15 volts e.m.f.)

R. F. Amplifier Board

28. The r.f. amplifier consists of two similar stages 3VT2 and 3VT3 each feeding into a low-pass filter. Considerable attention has been given to filtering and the amplifiers follow conventional practice, except for the method of applying automatic gain control which will be described in detail.

29. A.G.C. Action Consider the amplifier 3VT2. The gain of the amplifier can be varied according to the amount of capacitive by pass applied to the emitter resistor 3R9. The emitter by-pass is via capacitor 3C4 the junction of diodes 3D3 and 3D4 and capacitors 3C2 and 3C3 to earth.

30. The by-pass impedance is determined by the conductivity of the diodes 3D3 and 3D4 and this in turn can be controlled by the amount of d.c. bias applied by the emitter level of the control stage 3VT1. The current through 3VT1 and hence the emitter voltage, is controlled by the a.g.c. voltage applied to the base of 3VT1.

31. Under conditions of minimum a.g.c. action (maximum amplifier gain) the voltage on the a.g.c. line is -4V. This is applied to the base of 3VT1 via 3R3. This causes 3VT1 to conduct heavily and draw the maximum current through the emitter path formed by the chain of diodes 3D1 to 3D4. Under these conditions the impedance of the by-pass from the emitter of 3VT2 is a minimum and amplifier gain is therefore at a maximum. It is essential that the diode chain has a low forward resistance. A high resistance diode could cause a reduction in the maximum gain of the amplifier.

32. Increasing signal strength may cause the a.g.c. voltage applied to the base of 3VT1 to become less negative, as a result the current in 3VT1 decreases and the impedance of the diode path increases, thereby reducing the gain of 3VT2. Under conditions of maximum a.g.c. the level at the emitter of 3VT1 may reach 0 volts but the diodes 3D5 and 3D6 (with 3R5) will ensure that the junction of 3D5 and 3D4 remains at approximately 1.5 volts negative, thus ensuring that the diode chain 3D1 to 3D4 is completely cut off, thereby interrupting the emitter by-pass circuit of 3VT2 and reducing the amplifier gain to a minimum.

33. Temperature Compensation. The thermistor 3TH1 in parallel with 3R2 provides temperature compensation. With rising temperature the current in 3VT1 tends to increase. This is counteracted by a decrease in the resistance of 3TH1 which has the effect of taking the

R. F. Module (Continued)

bias on 3VT1 towards a more positive level, thereby checking the increase in emitter current due to temperature rise.

34. Setting-Up 4RV1. The potentiometer 4RV1 which is mounted on the H. T. Filter board on the underside of the receiver (Fig. 18) is provided to allow for variations in diode characteristics, thus avoiding the necessity for selection or matching of components. Adjustment should be necessary only when putting a new amplifier board into service or following component changes. The setting is quite critical and adjustment should be made strictly according to the procedure given in the alignment chapter. The general principles of the adjustment procedure are as follows:

35. The system switch is set to Manual and the R. F. GAIN control is set to the maximum gain position, thereby causing the a. g. c. line to acquire a level of -4 volts to chassis. A d. c. voltmeter (AVO 8) is connected to the collector of 3VT1 (-ve) on the r. f. amplifier board.

36. Potentiometer 4RV1, should be adjusted so that the collector voltage of 3VT1 decreases (becomes less negative) as the transistor is brought towards saturation. The correct setting is the exact point where the collector voltage just ceases to change, indicating that the transistor has 'bottomed'. The actual reading on the voltmeter at which this occurs will probably be between 3 and 4V negative. A 'bottom' reading greater than –4 volts indicates that the diode chain has a high forward resistance which will be detrimental to amplifier gain. The forward resistance of any diode in the chain should not exceed 25Ω when measured on the 'ohms ✦ 100' range of the AVO Model 8 test meter. (Diodes type HD1812)

FIRST MIXER

FIRST MIXER (BA. 28211) Fig. 8

37. A balanced mixer circuit is used to reduce the possibility of the second harmonic of a 40 MHz signal entering the 40 MHz filter. The incoming signal from the r. f. unit is fed into transformer T1 and drives the emitters of VT1 and VT2 in push-pull. The first v. f. o. frequency is applied via PL3 and C4 to the bases of VT1 and VT2. The circuit is balanced by the potentiometer RV1.

38. The mixer output appears in the inductor L1 which is mounted in a sub-assembly with the remaining inductors of the 40 MHz filter, L2 to L8. Each coil has an adjustable core which combined with the critical spacing of the coils determines the response of the filter which has a passband 650 kHz either side of 40 MHz. It is essential that the filter should have a sharp cut-off, particularly on the high frequency side, to prevent the first v. f. o. frequency entering the filter when the v. f. o. is operating at the lower end of its frequency range.

FIRST V.F.O. Fig. 5

39. The first v.f.o. consists of three sub-circuits mounted on individual boards. The oscillator is a conventional Hartley circuit tuned by the Megahertz tuning capacitor C1 which is not mounted on the board. The oscillator frequency range is 40.5 MHz to 69.5 MHz. Normally the lowest frequency used is 41.5 MHz when the Megahertz tuning control is set to 01. The oscillator output is taken from a tapping near the earthy end of inductor L1 and fed to two buffer amplifiers in parallel.

40. The two buffer amplifiers are identical circuits, the only difference being that one feeds out via plug PL2 to the first mixer stage and the other via PL1 to the harmonic mixer (37.5 MHz generator). A cascode circuit is employed to obtain adequate buffering, and the circuits are entirely conventional. When removing the 1st V.F.O. module from the chassis the h.t. lead (violet) must be disconnected from the small terminal block beside the module. Some earlier receivers do not have this terminal block, in which case the violet wire must be unsoldered from the H.T. Filter board on the underside of the receiver. (Fig. 18).

37.5 MHZ GENERATOR MODULE

NOTE: This module contains the following two main assemblies:-

(a) The 1 MHz Oscillator, Amplifier and Calibrator

(b) The 37.5 MHz generator assembly consisting of a harmonic generator mixer and amplifier. Refer to instructions in Chapter 7 for obtaining access to this assembly.

The 1 MHz oscillator and the calibrator assembly will be described first.

1 MHZ OSCILLATOR AMPLIFIER AND CALIBRATOR Fig. 6

41. This assembly consists of two sub-circuits. One board contains the 1 MHz crystal oscillator and calibrator circuit, the other board contains the amplifier stages which provide buffering in the 1 MHz input and output circuits. The boards are mounted side-by-side on the upper (hinged) deck of the 37.5 MHz Generator Module. The calibrator is easily identified by the 1 MHz crystal mounted on the board.

1 MHz Oscillator and Calibrator

42. Transistor VT1 is contained in a conventional Pierce type of crystal-controlled circuit. The output is taken from the emitter via the capacitive divider C4 and C5 to provide the correct level at the base

circuits of transistors VT2 and VT3 on the amplifier board. The 1 MHz crystal XL1 is contained in a holder amd must be removed if an external 1 MHz reference source (synthesizer) is connected to the receiver.

43. The calibrator circuit is a 'divide by ten' integrated circuit which receives an input at 1 MHz from the amplifier VT2 on the amplifier board and supplies 100 kHz with harmonics via connector A2 to the 3rd mixer board.

44. The 1 MHz input is applied via pin 4 and R8 to the integrated circuit 1C1. The integrated circuit provides a 100 kHz output which is taken via diode D1 and connector A2 to the third mixer module where the required range of harmonics is injected for calibration of the receiver kHz scale.

1 MHz Amplifier

45. Transistors VT2 and VT3 on the amplifier board can be driven by the 1 MHz oscillator or they can be supplied with 1 MHz (via VT1) from an external source such as a synthesizer. The output from VT2 is fed from the junction of R9 and R10 to the connector A3, thence to the rear panel socket '1 MHz OUT'. The 1 MHz from VT2 also goes to the Detector board in the i.f. module to mix with the 600 kHz b.f.o. frequency.

46. Amplifier VT3 has a collector circuit which is modified by R15, C12 and R17 in order to pre-shape the output waveform to obtain a suitable drive for the harmonic generator. The effect of the pre-shaping is to convert one half-cycle of the sine wave to a peaked waveform capable of generating a wide range of harmonics. (see Chapter 4, paragraph 18). Amplifier VT1 buffers the 1 MHz input whenever a synthesizer or external frequency source is connected.

47. The calibrator circuit functions only when the system switch (SE2R Fig. 16) is set to CAL or CHECK B.F.O. In other switch positions the h.t. supply to the calibrator is disconnected. When the calibrator is switched off it is essential that there shall be no leakage of 1 MHz into the third mixer stage. The leakage is prevented by diode D1 in the amplifier board which is reverse-biased in all settings of the System switch except CAL and CHECK B.F.O. In the two latter settings of the System switch the -ve voltage forward-biases D1 which allows 1 MHz to pass to the calibrator.

HARMONIC GENERATOR AND MIXER (37.5 MHZ GENERATOR) Fig. 7

48. This section consists of five small sub assemblies which are numbered 1 to 5 the same numbering also being shown on the circuit diagram. The section is contained in the same module as the 1 MHz amplifier and calibrator. The combined module is commonly referred to as the '37.5 MHz Generator'.

Harmonic Generator (Board 1)

49. The function of this stage is to produce a wide range of harmonics of 1 MHz, which it does by virtue of the pre-shaped 1 MHz input and the special characteristics of the diode D1. The capacitive property of the diode has the effect of producing a very fast edge possessing a high harmonic content which is applied to the base of VT1. The entire range of harmonics (up to at least the 32nd) must be amplified by VT1 without discrimination in favour of any particular frequency. The pre-set capacitor C1 can be adjusted to provide a constant amplitude over the harmonic range, measured at the output (pin 4). The diode D2 is provided as a safeguard against excessive base voltages. A similar diode connection is seen in the 37.5 MHz amplifier (D1 and D2).

Harmonic Filter (Boards 2 and 3)

50. This is a low-pass filter designed to pass all harmonic frequencies between 3 and 32 MHz but with a sharp cut-off immediately above 32 MHz. The output of the filter is applied to the base of VT1 on the harmonic mixer board.

Harmonic Mixer (Board 4)

51. A balanced type of mixer circuit is used so that the harmonic spectrum and the input from the first v.f.o. will tend to cancel each other at the output. The harmonic spectrum input is supplied via pin 2 to the base of VT1. The 1st v.f.o. output is supplied via pin 4 to the base of VT2. Mixing takes place in the common collector circuit L1, C7, C8 which is tuned to 37.5 MHz. The output via pin 5 is fed to the cascode amplifier board. The circuit is balanced by potentiometer RV1 by which the bias on each transistor can be adjusted so that the emitter currents are equal. This adjustment is described in Chapter 3.

37.5 MHz Amplifier (Board 5)

52. This is a buffer stage in a cascode circuit mounted on board number 5. A cascode circuit is used to provide adequate buffering with a low noise figure. The capacitor C7 provides neutralizing feedback. The collector circuit of VT2 (T1, C4) is tuned to 37.5 MHz and the secondary of T1, is connected to socket SKT1, which mates with plug PL1, on the 37.5 MHz filter unit.

37.5 MHz Filter Unit

53. This is a separate unit mounted on the receiver chassis which is connected to the output from the 37.5 MHz amplifier. The filter is designed and set-up to provide a passband of plus or minus 150 kHz centred on 37.5 MHz. The correct alignment of this filter is vital to the satisfactory functioning of the Wadley system. The user is advised not to attempt any adjustment of the filter alignment.

SECOND MIXER

Fig. 9

54. The second mixer produces the 2nd i.f. by mixing the 40 MHz i.f. spectrum with the 37.5 MHz injection, and selecting the 2 to 3 MHz difference frequency. The stage VT1 and VT2 is a cascode buffer amplifier similar to the buffer circuits in the 37.5 MHz generator module. The 37.5 MHz is supplied via connector A2 and pin 1; the test point TP1 is provided to check the injection level. The stage is neutralized by capacitor C19 and the collector circuit T1 and C3 is tuned to 37.5 MHz. The secondary of T1 forms part of the emitter circuit of the mixer stage VT3. The capacitor C3 is wired to the rear of the printed circuit board.

55. The 40 MHz i.f. is supplied via A3 to the base of VT3. The resistor 1R4 terminates the 40 MHz filter. Test points TP3 and TP2 are provided to check the signal and injection levels, respectively. The collector circuit L1 and C8 form part of the 2-3 MHz band-pass filter and is tuned to the difference frequency, which is in fact a spectrum of signals extending from 2 MHz to 3 MHz. The output is coupled via C9 to the remainder of the 2-3 MHz band-pass filter. Signals via an l.f. adaptor unit, which have been translated to the 2 to 3 MHz band, can be fed in via the LF socket on the receiver rear panel via connector A1 and pin 5 to the input of the 2-3 MHz band-pass filter. A panoramic adaptor can be connected to the rear panel socket PAN. This unit examines the spectrum of signals at the collector of VT2. The band-pass filter is terminated by a 39Ω resistor in the 3rd mixer stage.

THIRD MIXER

THIRD MIXER (BA.35970) Fig. 11

56. In the third mixer the 1 MHz spectrum of signal frequencies from the 2nd mixer (2–3 MHz) is mixed with a frequency (3.6 - 4.6 MHz from the second v.f.o. The difference frequency contains the required signal intelligence at a frequency of 1.6 MHz. A 100 kHz input from the calibrator which is supplied via the connector A3 provides harmonics to which the 2nd v.f.o. (kHz) tuning scale can be aligned.

Signal Input

57. The preceding 2 to 3 MHz band-pass filter (Fig. 9) is connected via socket A4 to the low-pass filter, formed by 1L1 1C1 and 1C2, which has a cut-off at approximately 5 MHz. The function of the filter is to give additional protection against 6 MHz and 37.5 MHz.

58. The filtered signal spectrum is fed via 1C3 and 1L2 to pin 1 on the mixer board thence via the blocking capacitor C1 to transformer T1 of the diode mixer circuit.

Calibrator Input

59. Also applied to T1 is the harmonic input from the calibrator, via A3 and the diode 1D1. This input is switched off except when the System switch is at CAL or CHECK BFO but in order to ensure that there shall be no leakage of the fundamental 1 MHz, even though the calibrator is switched off, a suitable negative voltage is developed at the junction of R1 and R2. This reverse biases the diode in the calibrator output.

Input From Second V.F.O.

60. The variable 3.6 to 4.6 MHz from the second v.f.o. is supplied via the coaxial connector A2 to the band-pass filter formed by L7, L6, L4 and L2 and associated capacitors. Termination is provided by R7 in parallel with the primary of T2. The filter pass-band should extend from 3.6 MHz to 4.6 MHz with a fairly sharp cut-off above and below these limits. The filter is inserted to meet the following requirements:

(a) The second v.f.o. is a wideband source and it is necessary to exclude the noise generated at the signal frequencies between 2 and 3 MHz, at 1.6 MHz, and also at the image frequencies of 5.2 MHz and 6.2 MHz.

(b) If two receivers are connected in a master-slave relationship using a common 2nd v.f.o., the filter will prevent cross-talk arising from coupling between the respective 2 to 3 MHz circuits which could occur via the 2nd v.f.o.

61. The input from the second v.f.o. is applied via T2 to the bases of the balanced amplifier stage VT1 and VT2. Note the test point TP2. The collectors of VT1 and VT2 are connected via R6 and R9 to the transformers T1 and T3 respectively in the diode mixer circuit.

Mixer Circuit

62. The mixer circuit consists of the diode ring D1 to D4 together with transformers T1 and T3. This type of mixer is selected for its linearity which cancels the 'odd order' mixing which tends to occur where the input spectrum has a fairly wide bandwidth (in this instance 2-3 MHz) and the i.f. output (1.6 MHz) almost comes within the input spectrum.

63. The sum and difference frequencies from the mixer are fed via T3 into the filter formed by L3 and L5 with C3, C5 and C6. This is a wideband filter centred on 1.6 MHz. Note the test point TP1 at the input to the filter. Associated with this test point is provision for connecting a 68Ω resistor for test purposes only. The 68Ω resistor is connected when aligning the filter to ensure that the coupling factor between L3 and L5 is less than unity. This alignment is done at the factory and should not normally be attempted by the user.

64. The amplifier VT3 provides the output required to drive the i.f. unit. The 1.6 MHz output from the collector is taken via C12 and the coaxial connector A1 to the bandpass filter FL1, thence to the 1st i.f. amplifier unit. The resistor R14 matches the input impedance of the filter.

1ST I.F. AMPLIFIER UNIT

1ST I.F. AMPLIFIER UNIT — Fig. 11

65. This is a small unit containing a single stage serving as a buffer between the crystal bandpass filter FL1 and the subsequent crystal bandpass filter selected by the bandwidth switch. The circuit is illustrated on the right hand side of Fig. 11. The wideband tuned inductor L1 is tapped to provide separate outputs having impedances of 100Ω and 1 kΩ respectively. The 1 kΩ output feeds the subsequent filters (Fig. 16) and the 100Ω output is used for reception in the widest setting of the I.F. BW switch without further filtering. The core of L1 is adjustable via a hole in the side of the container.

SECOND V.F.O.

General — Fig. 10

66. The second v.f.o. assembly consists of an oscillator driving two wideband buffer stages. The oscillator can be tuned over the range 3.6 to 4.6 MHz by the KHz tuning control of the receiver, also, fine variations of tuning can be made by the FINE TUNE control. Two outputs are provided, one to the 3rd mixer and the other for external use. (2nd V.F.O. OUT). The oscillator stage can be switched off by setting the front panel 2nd V.F.O. switch to EXT which permits the receiver kilohertz tuning to be determined externally by either a synthesizer or the 2nd v.f.o. of a master receiver.

Oscillator Stage

67. The oscillator VT1 works into a tuned collector circuit comprising the inductor L2, and the KHz tuning capacitor C1 with its associated preset trimming capacitor. These tuning components are mounted on a separate sub-assembly. The oscillator tuning can also be shifted by the variable capacitance diodes D1 and D2. The junction of the diodes is connected via PL1 pin 1 to the CAL-FINE TUNE potentiometer 1RV3, which provides a variable -ve voltage which can shift the 2nd v.f.o. frequency by approximately 8 kHz over the full range of the control.

68. The remainder of the oscillator circuit is conventional. The diodes D1-D4 provide d.c. stabilization against possible variations in h.t. voltage arising from extreme temperature changes affecting the power unit. The oscillator output is taken from the junction of the coupling network R7 and R8 which minimizes any loading effects on the oscillator tuned circuit.

69. The oscillator h.t. supply is connected to pin 5 via the 2nd V.F.O. switch which is mounted on the front panel of the receiver. When this switch is set to INT the 2nd v.f.o. is in operation and an output is available for external use if required. When the switch is set to EXT the oscillator h.t. supply is disconnected and the 2nd v.f.o. frequency for the receiver must be fed in from an external source, such as a synthesizer or master receiver. The external frequency is switched by the gating diodes on the buffer amplifier board.

Buffer Amplifier Board

70. The diodes D2 and D3 enable the user to switch from internal 2nd v.f.o. to an external source, and vice versa, without the changing or removal of cable connections.

71. When the oscillator stage is running, the diode D2 on the amplifier board is forward-biased by the negative supply which is connected through the 2nd V.F.O. switch (INT position) thence via pin 5 on PL1 and R2 to the diode. This allows the oscillator output to pass via D2 to the amplifier VT1. At the same time the diode D3 is reverse-biased, thus isolating the external input.

72. When the 2nd V.F.O. switch is set to EXT the negative supply is disconnected from pin 5 and connected instead to pin 4 of PL1 whence it is applied via R4 as a forward bias to diode D3. The external input can now pass via A1, C2 and D3 to the amplifier VT1. The resistor R6 (75Ω) terminates the input connector. In this condition diode D2 is reverse-biased thus isolating the oscillator circuit from the amplifier board.

73. The transistors VT1, VT2 and VT3 are wideband buffer stages which provide suitable output levels from the collector circuits. The output from the collector of VT2 is connected via C6 and socket A2 to the 3rd mixer, the resistor R18 provides the required 1 kΩ source impedance

to the bandpass filter on the mixer board. The external output is taken via C9 from the collector of VT3, the resistor R22 providing the required 75 ohm source impedance for the connector.

B. F. O. ASSEMBLY

Fig. 13

74. The B. F. O. assembly consists of the DET - B. F. O. switch assembly and variable tuning capacitor, together with a 600 kHz oscillator board and a buffer amplifier. The b. f. o. frequency can be adjusted in fixed steps by the positions +6 to -6 of the DET-B. F. O. switch SB and varied by the fine tune capacitor C2 which is controlled by the central knob of the B. F. O. TUNE control. Switch SB has certain other functions which are described in a later paragraph.

600 kHz Oscillator Board

75. The oscillator VT1 is tuned by the inductor L1 and the variable capacitor C2. In parallel with C2 are four preset capacitors C2, C3, C5 and C6 which are connected in the +3, 0, -3 and -6 positions respectively of switch SB2F, each one providing a progressive reduction of oscillator frequency in 3 kHz steps. The oscillator is initially set-up with the DET B. F. O. switch set to position '+6' and the variable control C2 set to its mid-travel position. The core of L1 is then adjusted to provide an output at 606 kHz. In each of the subsequent switch positions (+3, 0, -3, and -6) the appropriate capacitor C2, C3, C5 or C6 is adjusted to give the required frequency. The oscillator output is taken from the junction of R1 and R2 which provides a low-level input to the buffer amplifier.

76. The negative h. t. supply to the amplifier and oscillator is permanently connected, but the positive (earth) side of the supply to the 600 kHz oscillator stage is connected via pin 5 and the +6 to -6 positions of switch wafer SB1F thence via a wafer on the System switch to earth. In the switch positions LSB, USB and A. M. the earth is disconnected from the b. f. o. thus switching off the 600 kHz oscillator.

DET B. F. O. Switch SB

77. The function of each wafer will be described briefly.

78. SB1F: The wiper contact (tag 9) is connected to earth in all positions of the system switch except CAL. (Thus ensuring that the b. f. o. is switched off during the calibration procedure). The LSB and USB positions of SB1F connect the earth to the detector board (i. f. module) where it serves to connect the appropriate crystal for the s. s. b. off-set oscillator.

79. SB1R: In the A. M. position of the DET B. F. O. switch an earth is made to pin 2 of the Detector board (i. f. module) in order to connect the a. m. detector.

80. SB2F: Contacts 1 to 5 which correspond to switch settings +3 to -6 connect the preset capacitors C2, C3, C5 and C6 respectively across the b.f.o. tuned circuit.

81. SB2R: In every switch position except A.M. an earth is made to pin 3 of the Detector board (i.f. module) in order to connect the product detector circuit.

B.F.O. Buffer Amplifier Board

82. This amplifier is designed mainly to buffer the b.f.o. from the Detector board circuits. The output is taken from the secondary winding of T1 which provides the low impedance required by the mixer in the Detector board. The adjustable core of T1 together with C2 tunes the output, and R5 ensures sufficient bandwidth to accept the plus or minus 8 kHz variation of b.f.o. frequency. Note that the screen of the cable from T1 secondary, which feeds the 600 kHz b.f.o. frequency to the i.f. module must not be earthed, because it constitutes a part of the base-emitter circuit of transistor VT5 in the Detector board.

I.F. BANDWIDTH SWITCHING

83. Provision is made for the fitting of five crystal bandpass filters, FL1 to FL5. The actual number and specification of the filters fitted is stated in the Technical Specification at the front of this Manual. The filter switching is illustrated in Fig. 16. The widest i.f. bandwidth is determined by FL1. The standard receiver also incorporates FL3 and FL4: the additional filters FL2 and FL5 can be incorporated at customers option. The bandwidths are switched by the I.F. B.W. control which operates the switch SA1F to SA4R illustrated in Fig. 16. This switch also selects the a.g.c. time constants to suit the bandwidth selected.

Bandwidth Switch Fig. 16

84. The input to the 1st I.F. Amplifier is filtered to the widest available bandwidth by the filter FL1. (Fig. 11). Two outputs are taken from the 1st I.F. amplifier. The 100 ohm output via 2R1 (Fig. 16) goes to switch wafer SA3F without further filtering. The 1000 ohm output goes via SA1F and SA1R to the selected filter, FL2 to FL5, then to the wafers SA3F and SA3R. The filters are terminated by resistor 2R4. The 1.6 MHz output is fed via plug 1PL3 to the socket SKT4 on the main I.F. Module (Fig. 12).

85. A.G.C. Over-ride. It is the function of the wafer SA2 (Bandwidth switch Fig. 16) to ensure that the short time-constant a.g.c. cannot be used whenever the I.F. B.W. control is set to select the filters FL1 or FL2. If the System switch is set to 'A.G.C. Sh' the Bandwidth switch over-rides this setting and substitutes "medium time-constant', as follows:

86. The required a.g.c. time-constants are selected by the connection of an earth to the appropriate time-constant capacitor in the a.g.c. board of the i.f. module. This earth connection is made by contacts on the System switch wafer SE1F. The short time-constant path is connected to the System switch (tag 2) via the wafer SA2R of the Bandwidth switch. When the filters FL1 or FL2 are selected, the "a.g.c. short" earth line is connected via SA2F tags 1 or 2, to the medium time-constant capacitor in the a.g.c. board. In the remaining positions of the Bandwidth switch the the 'a.g.c. short' connections are normal. To sum up; 'long' and 'medium' a.g.c. is available in all settings of the I.F. B.W. control, but a.g.c. short is confined to the settings 3 kHz and above.

NOTE: The above description refers to the standard bandwidths. Any modification to suit a customers special requirements will be described in an Appendix to the handbook.

I.F. MODULE

87. The I.F. Module contains the following printed circuit boards, illustrated in Fig. 12.

(a) I.F. Amplifier Board.
(b) Detector Board.
(c) A.G.C. Board.
(d) I.F. Converter Oscillator Board.
(e) I.F. Converter Amplifier Board.

CONNECTIONS

88. The 1.6 MHz i.f. from the bandwidth switch is fed into the i.f. module via the coaxial connector SKT4 at the forward end of the module. All other connections to the receiver are via the 37-way connector 1SKT1. Details of the 37-way connections are shown in Fig. 16. External connections are made via the coaxial sockets, SKT1, SKT2 and SKT3 and the terminal block TB1 mounted on the module and accessible at the rear of the receiver. These outlets are shown in Fig. 12.

I.F. AMPLIFIER BOARD Fig. 12

89. The three amplifiers VT1, VT3 and VT4 employ conventional pre-tuned collector circuits with damping resistors R4, R16 and R20 respectively, to ensure a wide bandwidth. A moderate amount of stabilizing feedback is applied to each stage by an un-bypassed resistor in each emitter circuit. The transistor VT2 together with the diode D1 and associated components form part of the a.g.c. system and will be described in more detail.

I. F. MODULE (Continued)

90. The transistor VT2 is connected in the emitter circuit of VT3 and is in effect a variable feedback device which determines the gain of VT3 under the control of the a. g. c. voltage. The a. g. c. voltage is fed in at pin 3 and via R9 to the base of VT2. Consider first the state when the signal is weak. The a. g. c. line will be at its maximum negative level. This causes VT2 to saturate and offer a low impedance, thus reducing the amount of un-bypassed resistance in the emitter circuit of VT3, resulting in higher gain.

91. Increasing signal strength causes the a. g. c. level to become less negative, and VT2 conducts less heavily, thus increasing the resistance in the emitter circuit of VT3 which results in lower gain. The combined effect of D1 with R7, R8 and R9 is to modify the characteristic of VT3 so that the curve of amplifier gain plotted against change of a. g. c. volts is less abrupt, thus improving the stability of the circuit.

92. The 1. 6 MHz output from VT3 is taken from two tappings on L2. One output is taken via C11 to the buffer amplifier VT4. This stage is similar to the preceding amplifiers but is provided with an additional hum-filtering capacitor C14. The other output from L2 goes to a 1. 6 MHz amplifier on the A. G. C. Board. The circuit description will continue by tracing the signal path as it leaves the i. f. amplifier via C16 and pin 5 en-route to the Detector Board.

DETECTOR BOARD

93. The Detector board contains the a. m. and product detectors, also the offset crystal oscillator for s. s. b. reception. The a. m. detector operates only in the A. M. position of the DET-B. F. O. switch and the product detector operates in all the remaining positions. The switching of these circuits depends upon the biasing of various diodes.

A. M. Detector

94. In the A. M. position of the DET-B. F. O. switch +ve h. t. (earth) is applied via pin 2 and R8 to resistor R3 and diode D2. This forward biases the diode thus completing the collector circuit of VT2. At the same time the current through R3 saturates VT1 thus completing the emitter circuit of VT2, via R6, VT1 and R5. The diode D1 is reverse biased by the negative rail connection via the path R4, R11, R19 and R18. Hence VT2 acts as a conventional 1. 6 MHz amplifier with the collector circuit tuned by the inductance of T1 with capacitor C1.

95. The 1. 6 MHz signal appears in the secondary windings of T1. The signal across pins 1 and 6 of T1 is detected by the diode D4 the load being formed by R11, R19 and R18. The detected signal is filtered by C6, L2 and C8, and passed via C9 to the audio emitter-follower VT3. Thence via C7, pin 8 and PL1 pin 7 to the A. F. GAIN potentiometer. A detector output is taken from pin 8 on the Detector board to pin 5 of the

terminal block TB1 at the rear of the receiver to drive a loudspeaker amplifier or tone converter etc.

96. It will be noted that the output circuit of the b. f. o. amplifier VT4 is connected to the emitter circuit of VT2. Whenever the a. m. detector is in operation, a contact on the DET-B. F. O. switch cuts off VT4 to ensure that the signal-to-noise ratio is not degraded by noise injected from this source.

Product Detector

97. The product detector utilizes the circuit of VT1 and VT2 but with certain changes achieved by diode biasing. Due to the setting of the DET-B. F. O. switch (all positions except A. M.), pin 2 is open circuited and pin 3 is connected to earth. A -ve voltage is applied via R9 and R8 which cuts off VT1 via R3, and reverse biases D2. Thus, with VT1 cut off, the emitter path of VT2 is through R5, the secondary winding of T2, R7 and R6. The earth on pin 3 supplies h. t. + through R11, R4 and D1 to complete the supply to VT2, at the same time it disables the a. m. detector by a reverse bias on D4. The output from the b. f. o. amplifier VT4 via the secondary of T2 is supplied to the emitter circuit of VT2, and the 1. 6 MHz signal from the i. f. amplifier board is supplied to the base of VT2. The product detector output is taken from the junction of R4 and R11. This audio output then follows the path described for the a. m. detector.

S. S. B. Offset Oscillator

98. Transistor VT6 on the Detector board is a crystal oscillator stage which operates in the L. S. B. and U. S. B. positions of the DET-B. F. O. switch, provided the system switch is not set to CAL. (In the CAL position all b. f. o. circuits are disabled to prevent interference with the calibration procedure).

99. The oscillator frequency is determined by the crystal XL1 (DET-B. F. O. switch set to L. S. B.) or by XL2 (DET-B. F. O. switch set to U. S. B.) according to whether the oscillator is to run 1. 5 kHz above or 1. 5 kHz below, the 1. 6 MHz i. f. Each crystal has a preset capacitor in parallel (C21 and C22) for alignment purposes.

100. When the DET-B. F. O. switch is set to U. S. B. and the System switch is set to any position except CAL, +ve h. t. is connected via plug PL1 to pin 15 on the Detector Board and through R32 to the diode D7. This forward biases D7 which conducts, thereby completing the crystal circuit for VT6 which oscillates at the frequency of XL2. Crystal XL1 remains open circuited by the reverse bias on diode D6 due to the negative rail connection. In the L. S. B. position of the DET-B. F. O. switch the forward bias is removed from D7 and applied to D6 via R33, thus connecting XL1. Diode D7 reverts to the reverse biased condition. The oscillator output is taken from the emitter of VT6 and fed from the capacitive divider C18 and C19 which via R24 provides the correct impedance into the base of the mixer VT5.

I. F. MODULE (Continued)

101. This stage operates as an amplifier when the DET-B. F. O. switch is set to the L. S. B. and U. S. B. positions, and as a mixer in all positions from +6 to -6. The function of the mixer is to combine the 1 MHz from the receiver crystal source with the variable 600 kHz from the b. f. o.

102. Mixer Action. The emitter of VT5 is connected via plug PL1 to the output winding of the 600 kHz transformer in the b. f. o. assembly. Thus, whenever the DET-B. F. O. switch is set to any of the positions from +6 to -6, the b. f. o. frequency is supplied to VT5. It should be noted that the screen of this connection is the return path of the emitter-to-base circuit of VT5 and must not be earthed. The base of VT5 is connected via C17 and plug PL1 to the receiver 1 MHz crystal source. The output from VT5, which is 1. 6 MHz plus or minus any variation applied by the B. F. O. fine tuning control is taken via the tapping on L3 to the amplifier VT4.

103. Amplifier Action. When the DET-B. F. O. switch is set to L. S. B. or U. S. B. the 600 kHz b. f. o. frequency is removed and VT5 amplifies the crystal frequency 1601. 50 or 1598. 50 kHz fed in from VT6 and passes it via L3 to VT4.

Amplifier VT4

104. This is a conventional amplifier with stabilizing feedback provided by R16. The collector circuit is tuned by T2 and C12, and damped by R17 to ensure sufficient bandwidth. The output from T2 secondary is connected to the emitter circuit of VT2. When the DET-B. F. O. switch is set to A. M. it is necessary to cut off VT4 to prevent noise reaching the emitter circuit of VT2; this is done by disconnecting R19 from earth at the b. f. o. switch SB2R (Fig. 13)

A. G. C. BOARD

105. The a. g. c. board contains two amplifiers operating at 1. 6 MHz, followed by the a. g. c. detector and d. c. amplifier feeding into the time-constant circuits. The remainder of the board is concerned with providing d. c. amplification and manual gain control facilities etc. Provision is made for connecting the a. g. c. circuit to a companion receiver in dual diversity operation.

Amplifier VT1

106. This is a 1. 6 MHz amplifier tuned by L1 in the collector circuit. The input at 1. 6 MHz is applied via C1 to the base of VT1 and separate outputs are taken from tappings on L1. The output via C5 is at a level of 100 mV for external use and is connected, via pin 3 to the 1. 6 MHz OUT socket at the rear panel of the receiver. The output via C4 is fed to the base of VT2 and also to the converter board via pin 4. It is reduced in level by the capacitive divider formed by C4 with C3. This arrangement is necessitated by the requirement to obtain two different levels from the one output circuit.

I. F. MODULE (Continued)

Amplifier VT2

107. Transistor VT2 is a 1.6 MHz amplifier with a collector circuit tuned by L2 with C9. The inductor L2 is connected as a step-up transformer so that the stage presents a high impedance to the a. g. c. detector.

A. G. C. Detector

108. The amplified 1.6 MHz from VT2 is coupled to the a. g. c. detector D1 via C10. The components R13, R14, C12 and C13 form an r. f. filter between D1 and the emitter-follower VT3.

A. G. C. Output

109. Under weak signal conditions current flows in VT3, causing a voltage drop across R15 which reverse-biases the diodes D2, and D3 via the time-constant network C14, C15, C16, R16, R17 and RV1. The a. g. c. output voltage at pins 14, 15 and 16 will be at its maximum negative level.

110. An increase in signal strength will cause the voltage at the base of VT3 to become more negative and less current will flow in R15. The diodes D2 and D3 become forward-biased, leading to a fall in current through VT4, therefore the voltage across R21 will be less negative. This causes a change of current in VT5. The output of VT5 is coupled to the emitter-follower VT6 via the System switch wafer SE1R (all settings except MAN). In the MAN setting of the System switch the a. g. c. level from VT5 is disconnected, and a variable -ve voltage, obtained via the R. F. Gain potentiometer 2RV2, is used to manually bias the a. g. c. line which controls the i. f. and r. f. amplifier stages.

111. The final a. g. c. output is taken via three parallel paths from the emitter of VT6. The output at pin 15 is used within the i. f. unit to control the 1.6 MHz amplifier. The output from pin 14 goes via PL1/1SKT1 pin 34, to the microswitch 1SA (Fig. 16) and from pin 16 the output is fed via the Meter switch (R. F. setting) to the 'S' meter on the receiver front panel.

112. The a. g. c. line voltage from an associated dual-diversity receiver or i. s. b. adaptor can be connected to the junction of diodes D2 and D3 via, pin H on the 12-way socket at the rear of the receiver, thence to pin 6 on the board.

I. F. Converter

113. Although the i. f. converter circuitry is mounted on two separate boards it should be regarded functionally as one circuit. Two types of converter are available but only one is fitted to a particular receiver, one produces a 455 kHz output and the other a 100 kHz output. The circuit differences are confined to the oscillator crystal frequency, coils L1 and L2 on the oscillator board and the values of components R12 and C9. Resistor

I.F. MODULE (Continued)

R10 on the amplifier is not fitted to the 455 kHz version. Refer to NOTE 1 on Fig. 12.

114. The output of the crystal oscillator VT1 on the Converter board is fed via C3 and pin 3 to the amplifier VT1 on the amplifier board. The output from the amplifier returns via pin 4 to the emitter of the mixer stage VT2. The signal input at 1.6 MHz is applied via pin 5 to the base of VT2. The circuit L1, C8, C9, C10 and L2 provides filtering at the required i.f. Resistor R12 and capacitor C9 determine the passband, the values shown are for the 100 kHz version.

115. The mixer output is taken from a tap on L2, and via pin 7 to the amplifier board where it feeds into the base of VT2 which is part of the d.c. coupled two-stage amplifier VT2 and VT3. The direct coupled amplifier has overall feedback via R9 which gives a very low impedance at the input to V2 and contributes to the excellent thermal stability. The amplifier also has good linearity which minimises problems which might otherwise arise from intermodulation products.

116. The output circuit of VT3 (L1 and C8) is pre-tuned to the appropriate i.f. (455 kHz or 100 kHz). The resistor R10 is inserted only on the 100 kHz converter in order to off-set the higher 'Q' of L1 at the lower frequency. From a tap on L1 the output goes to the coaxial socket SKT2 on the rear panel. This socket will be engraved either 455 kHz or 100 kHz, according to the type of converter board which is fitted to the i.f. unit. It should be noted that the required termination is 50Ω for the 455 kHz and 75Ω for the 100 kHz converter.

117. If the RA.1217 is connected to a suitable frequency synthesizer, channel oscillator or master receiver, the production of the final i.f. can be locked to the external source by a frequency injected in lieu of the crystal XL1. When an external source is connected, the crystal XL1 must be removed from its socket. For the 100 kHz i.f. a frequency of 1.7 MHz may be supplied to the 1.7 MHz IN/OUT socket.

118. The RA.1217 may be used in a master-slave relationship with another receiver. For this purpose the crystal oscillator frequency is fed to the slave receiver via the socket 1.7 MHz IN/OUT (455 kHz IN/OUT).

AUDIO AMPLIFIER BOARDS

Alternatives

119. The standard RA.1217 receiver is fitted with a 10 mW audio amplifier board, but a one-watt board is available at customers option. It should be noted that there are restrictions on the amount of -16 volt power available from the power unit for external use when the one-watt board is fitted.

10 mW Audio Amplifier Board — Fig. 14a

120. The amplifier board contains two separate amplifiers. The circuits are conventional and will therefore be described only briefly. The a.f. output at the Detector board is taken via the slider of the A.F. GAIN control to the base of the driver transistor VT1. Input capacitors C2 and C3 are in parallel so that 1.f. attenuation can be provided by the removal of C3, if desired. Negative feedback is provided by R3. The push-pullstage VT2 and VT3 operates in class A in order to eliminate the need for any setting-up adjustments; negative feedback is applied by R9 and R10. The 10 mW 600 ohm output is supplied to the PHONES jack socket on the front panel and also to the outlets at the rear panel.

121. The line amplifier VT4 is supplied with an a.f. signal via the slider of the A.F. Level pre-set control. The additional input capacitor C10 may be removed if attenuation of the a.f. input is required. The 1 mW output is taken from the secondary winding of transformer T3 to the meter diodes and to a pair of pins at the rear panel outlet.

One-Watt Amplifier Board — Fig. 14b

122. The one-watt board contains two separate amplifiers:

(a) A one-watt push-pull section comprising transistors VT1 to VT5 suitable for driving an external 15 ohm loudspeaker.

(b) A low powered section (VT6 to VT8) which provides 1 mW into the transformer 1T1 for connection to an external 600 ohm line.

123. The one-watt amplifier is a transformerless push-pull circuit employing the principle of "complementary symmetry". The audio input from the signal detector is applied via the A.F. Gain potentiometer to the base of transistor VT1, which serves as a driver to the transistors VT2 and VT3. The bases of VT2 and VT3 are directly coupled to the collector circuit of VT1 and current variations in the circuit RV2, D1, D2, R1 and R2 will vary the base potentials of VT3 and VT2.

124. Transistor VT2 is an n.p.n. transistor which functions as an emitter-follower for positive-going inputs, while at the same time VT3 is cut off. On a negative-going input VT2 will cut off and the p.n.p. transistor VT3 will conduct, thus giving push-pull operation. The output transistors VT5 and VT4 are d.c. coupled to VT3 and VT2 respectively. It should be noted that transistors VT4 and VT5 are mounted in holders adjacent to the board and must be carefully released when removing the board from the chassis.

125. In the static condition the junction of R7 and R8 is at a potential which is half the supply voltage (i.e. at -8V). A variation in the current in VT4 and VT5 will produce a varying voltage at this junction, which via capacitor 1C12 drives the loudspeaker. Under static conditions the amplifier is balanced by means of potentiometer RV1 which permits accurate adjustment of the half-supply voltage at the juntion of R7 and R8 (pin 5).

126. A.F. negative feedback is provided by capacitor C1 and to limit the frequency response a low value capacitor C3 is connected between collector and base of VT1. The diodes D1 and D2 provide temperature compensation to balance the effects of temperature change on the base-emitter junctions of VT2 and VT3. The potentiometer RV2 permits adjustment of the quiescent bias conditions of VT2 and VT3.

127. Adjustments. With no audio input connect a d.c. voltmeter to pin 5 (-ve) and chassis (+ve). Adjust RV1 for a reading of -8 volts. To adjust RV2 the -16V (violet) wire must be unsoldered from pin 6 and a milliammeter connected in series. RV2 is then adjusted for a reading of 55 milliamps. Re-connect the -16V lead and then re-check the -8 volt reading at pin 5. Re-adjust RV1 if necessary.

1 mW Amplifier

128. The 1 mW section follows conventional practice. The input from the signal detector is applied via the A.F. Level potentiometer and pin 7 to amplifier VT6 which is coupled via an emitter-follower VT7 to the output transistor VT8. The capacitor C7 is inserted to limit the frequency response.

POWER SUPPLY MODULES

129. The standard type of power module is the PU.1153. The unit consists of a main assembly to which is attached a printed circuit board containing the stabilizer circuitry. Referring to Fig. 15a, the components mounted on the assembly are prefixed '1'. Those references without a prefix are located on the printed circuit board.

INPUTS

130. The PU.1153 can operate from the following supplies:

100-125 volt a.c. 45-400 Hz single phase
200-250 volt a.c. 45-400 Hz single phase
21- 27 volt d.c. with positive earth

OUTPUTS

131. -16 volt (regulated) 400 milliamps
-20 volt (unregulated) 200 milliamps. Generally, this level will be approximately 24 volts.

SWITCHES

AC/DC Switch

132. A locking plate desplays the type of power input, either 'A.C.' or 'D.C.' If the indication is not correct, remove the locking plate (one screw) set the switch in the alternative position and replace the locking plate in the reversed position so that the correct indication is displayed. This switch must be correctly set before switching on the receiver.

Voltage Selector Switch

133. This switch is in use when the A.C./D.C. switch is set to A.C. It should display the correct a.c. supply voltage range, either 115 or 225. If the setting is not correct remove the locking plate, reset the switch and replace the locking plate in the reversed position so that the correct voltage range is indicated.

POWER SUPPLY MODULES (Continued)

FUSELINKS

134. Two fuse links are provided. The MAINS fuse is in circuit whenever the A. C. / D. C. switch is set to A. C. The H. T. fuse is in circuit on both A. C. and D. C. supplies. Replacement fuses must be of the anti-surge type. When on 100-125V a. c. supply the MAINS fuse must be rated at 500 mA.

Replacement Fuselinks

135.	MAINS	250 mA (225V)	Beswick	TDC 134
		500 mA (115V)	Beswick	TDC 134
	H. T.	1 amp	Beswick	TDC134

POWER CONNECTIONS

136. The external power supply is connected via a 3-core power cable to which a suitable 3-pin connector should be fitted: for an a. c. supply connect the red lead to line; black to neutral and green to the earth (ground) pin. For a d. c. supply connect the red lead to +ve and the black lead to -ve. The free socket for connecting the power cable to the receiver plug is a Plessey MK. 4 2CZ83283/5 with accessory set 508/1/03008/205.

ADJUSTMENTS

-16 Volt Output

137. The potentiometer 1RV1 on the power unit should be adjusted to provide an output of -16 volts relative to chassis. A suitable measuring point is the terminal H. T. R. F. on the rear panel of the receiver.

Dimmer Resistance: Dial Lamps

138. The setting of the dimmer potentiometer 1RV2, which is accessible at the front panel of the receiver may be set by the user to provide a suitable level of illumination.

CIRCUIT DESCRIPTION PU. 1153

139. The external power supply which enters the module via the 3-pin connector is routed via the receiver ON/OFF switch and returns to the module via pins 15 and 13 of the 15-way connector 1SKT1.

140. In the A. C. setting of switch 1SB, the a. c. power is fed to the primary windings of transformer 1T1. The switch 1SA connects the windings in parallel for 100-125 volt input, or in series for 200-250 volt input. In the D. C. setting of switch 1SB the +ve d. c. input is connected to the 0 volt output, and the -ve input to the regulator transistor and to the unregulated -20 volt output.

POWER SUPPLY MODULE (Continued)

141 The fuse 1FS1 (Mains) protects the input to the transformer, the other fuse 1FS2 (H.T.) is common to both a.c. and d.c. inputs to the bridge rectifiers D1 and D2. The rectified output from D1 is fed to the stabilizer board and the output from D2, which is normally in the range 20 to 24 volts, is fed without stabilization to a pin on the 12-way outlet at the rear of the receiver.

142. The capacitors 1C1 and 1C2 serve as an r.f. filter. The resistor 1R1 is provided to discharge the capacitors when the power is switched off.

Stabilized D.C. Circuit

143. The output from the bridge rectifier D1 is fed to the filter capacitor 1C3. The transistor 1VT1 completes the connection to the -16 volt output line, and stabilizes the output by acting as a series regulator under the control of the d.c. amplifiers VT1 and VT2. The output can be set to -16 volts by adjustment of the potentiometer 1RV1.

144. The emitter of VT2 is held at a constant voltage by the zener diode D3. The level at the base of VT2 is determined by the setting of 1RV1 and also by any change of voltage occurring in the chain R4, 1RV1 and R5 due to a change in output load. For example, if an increase in output loading causes the voltage at 1RV1 to go less negative and the collector current in VT2 decreases. This causes a change in the base current of the beta multiplier VT1 which in turn increases the output of 1VT1 so as to maintain a constant output voltage.

145. To allow the stabilizer to operate from a wide range of input voltages the network R1, R2 and R3 together with the zener diode D4 provide input regulation. The diode D4 holds the junction of R1 and R2 at a constant 4.7 volts, thus clamping the base of VT1 at a constant level despite changes in input voltage. The electrolytic capacitor C1 eliminates ripple.

CHAPTER 2

TEST AND MAINTENANCE EQUIPMENT

1. The following items of test equipment are required for the procedures in Chapter 3 and 4.

R. F. Signal Generator

NOTE: A good quality signal generator, with a frequency range up to 8 MHz and a source impedance of 75 ohms is suitable for many of the tests, but to meet all requirements two signal generators of the following specification are required:

Frequency Range	10 kHz to 70 MHz
Output Impedance	75 ohms

A. M. Modulation distortion less than 10%

Example: Marconi TF. 144H, with 50 to 75 ohms adaptor and 20 dB pad for each instrument.

Multimeter AC/DC

Sensitivity	20 000 ohms/volt
Range	0 to 300 volts
Accuracy	2% of full scale
Example	AVO Model 8

Electronic Voltmeter (RF Voltmeter)

Input impedance	Not less than 1 megohm
Range (0 dB = 0. 775 volts)	Minus 50 dB to plus 10 dB
Frequency Range	Up to 70 MHz
Example	Airmec Type 301

Electronic Voltmeter (L. F.)

Input Impedance	Not less than 1 megohm
Range (0 dB = 0. 775 volts)	Minus 50 dB to plus 10 dB
Example	Advance Advac VM77

Digital Frequency Meter (Counter)

Frequency Range	1 Hz to 70 MHz
Accuracy	Internal reference frequency 1 part in 10^6 plus or minus 1 count.
Example	Racal Type SA. 550 with probe for high input impedance.

Output Power Meter

Frequency Range	100 Hz to 6000 Hz
Input Impedance	15 ohms and 600 ohms
Example	Marconi TF. 893A

Noise Generator

Output impedance	75 ohms
Example	Marconi TF. 1106

Oscilloscope

Frequency Range	0 to 30 MHz with dual trace.
Example	Tektronix 545A

Waveform Analyzer

Frequency Range	100 Hz to 10 kHz; capable of measuring to 40 dB minimum.
Example	Wayne Kerr A321

Audio Signal Generator

Frequency Range	100 Hz to 8000 Hz
Example	Advance Type J2

Telephone Headset — 600 ohm impedance

Tools

Spanners: $\frac{1}{4}$ inch AF (6.5 mm) and 10/32 UNF Hex.
Screwdrivers: Various
Hexagonal wrench (Allen keys): various sizes
Soldering iron.

Terminating Resistors

100 ohms	$\frac{1}{4}$ watt
75 ohms	$\frac{1}{4}$ watt
330 ohms	$\frac{1}{4}$ watt
27 ohms	$\frac{1}{4}$ watt

Heat Shunt

Required when soldering certain coil assemblies to the printed circuit board. Refer to the next page for details.

REPAIR DATA

IMPORTANT NOTICE

1. When soldering certain types of coil assembly to the printed circuit board, the heat can cause serious distortion of the coil former. The types of coil most liable to this distortion are those wound on a "Neosid" former, and the following precautions must be observed with these particular coils. The procedure is recommended for all coil soldering.

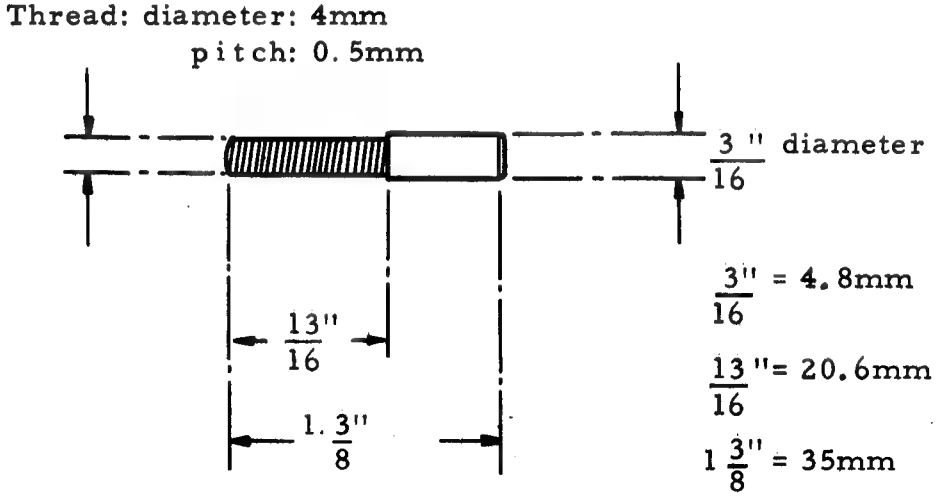
(1) Remove the adjustable core from the replacement coil assembly.

(2) Insert a brass 'dummy core' which acts as a heat shunt during the soldering operation.

(3) When soldering is completed, remove the brass heat shunt and insert the normal core.

HEAT SHUNT

2. The illustration below, shows the data required to make a suitable heat shunt for the above operation (4mm core).



Material: Brass

CHAPTER 3

PERFORMANCE CHECKS

INTRODUCTION

1. The instructions in this chapter provide a series of checks on receiver performance suitable for use subsequent to an overhaul, or in the event of adverse reports on receiver performance. Suitable test equipment is listed in Chapter 2. The tests should be performed in the order given. A satisfactory result must be obtained from the test being made before continuing with the next.

2. The performance requirements which are stated for each test refer to a newly-manufactured factory-aligned receiver, and should not be applied too rigidly to a receiver which has been in use for a considerable time. Furthermore, the user should assess the accuracy of his own test equipment when evaluating test results. Do not attempt to improve the receiver performance by adjusting any preset trimmer or core etc. other than in an approved test procedure.

NOTE: Signal generator levels are given as e.m.f. unless stated otherwise R.F. output voltages are r.m.s. unless otherwise stated.

CAUTION: While making test connections to the 12-way outlet on the rear panel, the receiver should be switched off to avoid an accidental short-circuit on the 1 watt output which might damage transistors.

MECHANICAL INSPECTION

3. (1) Check that all modules are inserted and made secure, with covers in position.

(2) Check all plug and socket connections.

(3) Check correct setting of the following switches at the rear of the receiver.

(a) A.C./D.C. selector switch as appropriate

(b) Mains Voltage Selector (225 or 115 as appropriate).

(4) The 2nd V.F.O. switch on the front panel should be set to INT.

(5) Check that fuses are of correct value and secure in their holders.

(6) Set the LOCK controls to OFF.

(7) Check all controls for smooth operation.

(8) Connect power supply to receiver.

POWER CHECK

4. (1) Connect the d. c. voltmeter -ve lead, (25 volt range) to the terminal H. T. R. F. on terminal block TB1 (Fig. 19).

(2) Remove the receiver cover.

(3) Set the System switch to MAN.

(4) Check that the voltmeter indicates -16 volts relative to chassis. If necessary, adjust potentiometer RV1 on the power module. (Fig. 18).

(5) Adjust the DIMMER potentiometer for a suitable level of dial illumination.

(6) Remove the test equipment.

SYSTEM CHECK

5. (1) Connect high impedance headphones to PHONES socket.

(2) Connect the signal generator (impedance 75 ohms) to the R. F. INPUT (Antenna) socket.

(3) Set the signal generator to 3. 5 MHz at 15 microvolts e. m. f. 30% modulation at 400 Hz.

(4) Set the receiver controls as follows:

(a) MHz control to 03.

(b) KHz control to 500.

(c) R. F. RANGE to WB.

(d) AE ATT to MIN.

(e) I. F. BW KHz to 3.

(f) R. F. GAIN fully clockwise (maximum gain).

(g) A. F. GAIN mid-position.

(h) CAL-FINE TUNE control to mid-position.

(j) DET-B. F. O. switch to A. M.

(5) Set the System switch to CAL.

(6) Adjust KHz tuning control around the 500 kHz indication and ensure that a beat note is heard in the phones.

(7) Set the System switch to CHECK B. F. O. Alter the KHz tuning by approximately 10 kHz. Switch the B. F. O. TUNE control through positions +6 to -6. Note that correct change of beat note occurs at each change of setting.

(8) Set System switch to MAN.

(9) Reset KHz control to indicate 500.

(10) If necessary, adjust signal generator frequency to the frequency of the receiver tuning.

(11) Set the RA. 1217 meter switch to A. F. position.

(12) Adjust the preset A. F. LEVEL control (on front panel) and note that the meter indication changes with variation in setting.

(13) Connect the -ve lead of a d. c. voltmeter, set to the 10 volt range, to the terminal A. G. C. R. F. on the rear panel.

(14) Set the RA. 1217 meter switch to R. F.

(15) Switch off the signal generator.

(16) Set the System switch to the A. G. C. positions Lg. Med and Sh. in turn. Check that -ve 4 volts is indicated on the d. c. voltmeter in each position.

(17) Switch on the signal generator and adjust the e. m. f. to 1 μV.

(18) Set the R. F. RANGE to 2-4 and adjust R. F. TUNE for maximum signal.

(19) Set the System switch to A. G. C. Med, then adjust the 'Meter Set Zero' preset control (see Fig. 18), so that 1 μV is indicated on the RA. 1217 meter.

(20) Note that the d. c. voltmeter indicates approximately -ve 4 volts (not less than 3. 8v) at the terminal 'A. G. C. R. F. '

(21) Increase signal generator output in 10 dB steps up to +80 dB, check that the a. g. c. level as shown by the d. c. voltmeter becomes less negative at each 10dB step. Also check that the RA. 1217 meter indicates approximately the appropriate 'S' level at each 10 dB step. At the 12-way rear panel outlet (SKT11) briefly earth pin G (Antenna Muting) and note that the 'S' Meter indication changes from 80 dB down to less than 10 dB when the earth is applied.

(22) Reduce the signal generator output level until the indication on the receiver front panel meter is 1 μV.

(23) Set the MHz tuning control to '00'. Note that the d.c. voltmeter a g.c. reading is removed.

(24) Transfer the d.c. voltmeter -ve lead to the terminal H.T. R.F. Turn the MHz control clockwise. Note a reading of -16 volts. Reset the MHz control to '00' and check that the voltmeter reading is removed.

(25) Set the MHz control to 03 and the System switch to OFF.

(26) Transfer the -ve lead of the d.c. voltmeter to pin H (A.G.C. DIV) of the 12 way outlet SKT11.

(27) Check that the signal generator is set to 3.5 MHz: 1μV e.m.f; 30% modulation: 400 Hz.

(28) Set the System switch to A.G.C. Med. The d.c. voltmeter should indicate 9.5V plus or minus 1 volt.

(29) Connect an l.f. electronic voltmeter to the terminal DET on TB1; a reading of 200 mV should be obtained.

(30) Set the System switch to OFF.

(31) Transfer the electronic voltmeter to the coaxial socket '1.6 MHz OUT'.

(32) Transfer the signal generator output to the coaxial socket 'L.F.'

(33) Set the signal generator to 2.5 MHz and an e.m.f. of 200 μV.

(34) Set the System switch to A.G.C. Med and check that the electronic voltmeter indicates not less than 60 mV.

(35) Set the System switch to OFF.

(36) Connect an electronic voltmeter to the socket 2nd V.F.O. OUT at the rear of the receiver. (unterminated)

(37) Set the System switch to MAN.

(38) Set the 2nd V.F.O. switch to INT. The electronic voltmeter should indicate 100 mV, approximately.

(39) Set the 2nd V.F.O. switch to EXT. Check that the indication noted in (38) has been removed.

(40) Reset the 2nd V.F.O. switch to INT. Remove all test equipment.

Crystal Frequency Check

NOTE 1: Receivers supplying a 100 kHz i.f. output are fitted with a 1.7 MHz crystal; if the i.f. output is 455 kHz the corresponding crystal frequency is 1.145 MHz.

NOTE 2: It will be necessary to remove the covers from the 37.5 MHz Generator Module and the I.F. module to make the adjustments.

6. (1) Connect a digital counter to the rear panel socket 1.7 MHz (or 1.145 MHz)

(2) Set the System switch to MAN.

(3) Check that the digital counter indicates 1.7 MHz (or 1.145 MHz) ±2 Hz.

(4) If necessary adjust the trimmer capacitor C4 in the Converter board of the I.F. Unit to achieve the 1.7 MHz indication. (See Fig. L12).

(5) Transfer the digital counter to the rear panel socket 1 MHz OUT.

(6) Adjust the trimmer C7 located on the 1 MHz board in the 37.5 MHz Generator Module (See Fig. L6, C7 is beside the crystal base).

(7) The digital counter should indicate 1 MHz ±2 Hz.

Auxiliary Inputs and Outputs.

NOTE: The receiver will have either a 1.7 MHz crystal (100 kHz i.f.) or a 1.145 MHz crystal (455 kHz i.f.).

7. (1) Terminate with 75 ohms each of the following sockets in turn and connect an electronic voltmeter to the terminated outlet. Set the System switch to MAN. The outputs should be as follows:

TABLE 1

	Socket	Required Output
(a)	1. MHz OUT	50 mV in 75 ohms
(b)	1.7 MHz OUT	30 mV in 75 ohms
	or	
	1.145 MHz OUT	30 mV in 75 ohms
(c)	2nd V.F.O. OUT	50 mV in 75 ohms.

(2) Set the System switch to OFF.

(3) Disconnect the power from the receiver.

(4) Remove the 1 MHz crystal from the 37.5 MHz Generator Module.

(5) Set the 2nd V.F.O. INT/EXT switch to EXT.

(6) Re-connect the power to the receiver. Set the System switch to MAN.

(7) Connect a signal generator sequentially to the sockets listed in Table 2 below. The signal generator output to be as stated in each case. Connect an electronic voltmeter and measure the output at the sockets listed in the right hand column of Table 2. The output in each is to be not less than 50 mV into 75 ohms.

TABLE 2

Connect Sig. Gen to these Sockets	Sig. Gen. Frequency	Sig. Gen. Output (75Ω Source)	Measure Output at the Sockets
1 MHz IN	1 MHz	100 mV e.m.f.	1 MHz OUT
2nd V.F.O. IN	4 MHz	100 mV e.m.f.	2nd V.F.O. OUT

(10) Set the System switch to OFF. Replace the 1 MHz crystal Replace the module covers.

KHz Tuning (2nd V.F.O.) Calibration Check

8. (1) Set the kHz tuning to '000' and the System switch to CAL.

(2) Adjust the CAL FINE TUNE control for an audio null in the phones.

(3) Set the kHz tuning initially to 100 and carefully tune with KHz control to obtain an audio null, which should occur within plus or minus 500 Hz of the 100 kHz calibration point.

(4) Set the kHz scale to exactly 100.

(5) Adjust the CAL-FINE TUNE control for an audio null.

(6) Measure the error at 000 kHz by tuning to the audio null in the vicinity of 000 kHz. The null should be within 500 Hz of the 000 kHz scale setting.

(7) Set the KHz tuning to exactly 200 kHz and adjust the CAL-FINE TUNE control for an audio null.

(8) Tune to the null and measure the error at the adjacent 100 kHz and 300 kHz points which should be within 500 Hz of the scale settings.

(9) Repeat this procedure at each 100 kHz point on the kHz scale.

(10) Calibrate the kHz tuning at the '500' setting. Then check the kHz re-setting accuracy by de-tuning and re-setting to this check point, first from a lower frequency then from a higher. The re-setting accuracy should be within plus or minus 200 Hz.

(11) Set the kHz scale to 500. Set the CAL-FINE TUNE control full clockwise and tune the kHz control for an audio null. Note the scale reading.

(12) Set the CAL-FINE TUNE control fully anti-clockwise and tune the KHz control for an audio null. Note the scale reading.

(13) The difference between the two scale readings of (11) and (12) should be not less than 7 kHz. This is the range of the CAL-FINE TUNE control.

MHz Tuning (1st V. F. O.) Calibration Check

9. (1) Connect a digital counter to either of the free coaxial plugs of the 1st V. F. O. module. These are located on a bracket on the underside of the receiver. (Fig. 18).

(2) Set the System switch to MAN.

(3) Set the MHz tuning scale to indicate 01.

(4) The digital counter should display a frequency of 41. 5 MHz plus or minus 20 kHz. If necessary make a careful adjustment of the MHz control setting to obtain this reading.

(5) Adjust the MHz tuning control over its full range of free movement but without changing the scale indication. The digital counter should indicate a variation of plus or minus 0. 12 MHz approximately.

(6) Set the MHz tuning control to 29 and adjust carefully.

(7) The digital counter should display 69. 5 MHz plus or minus 20 kHz.

(8) Set the MHz tuning successively in steps of 1 MHz from 01 to 20 on the scale. The digital counter should display 41. 5 MHz at 01 increasing by 1 MHz at each step. All

frequencies should be plus or minus 20 kHz. At each MHz point, free movement of the MHz control should produce a frequency variation of approximately plus or minus 0.12 MHz on the digital counter display.

(9) Remove all test equipment. Re-connect the 1st V.F.O. coaxial plug to its chassis socket.

B.F.O. Calibration

10. (1) Remove the cover from the I.F. Module.

(2) Connect a digital counter to test point TP1 on the detector board in the i.f. module. (On the collector of VT1, Fig. 12).

(3) Set the System switch to CHECK B.F.O. and adjust the B.F.O. TUNE control for an audio null.

(4) Operate the DET-B.F.O. control through all positions. Check that the digital counter indicates the frequency in accordance with Table 3.

TABLE 3

B.F.O. CHECK

Det - B.F.O. Control Setting	Measured Frequency at TP1 on Detector Board.
L.S.B.	1 601 500 Hz ±2 Hz
U.S.B.	1 598 500 Hz ±2 Hz
+6	1 606 000 Hz nominal
+3	1 603 000 Hz nominal
-3	1 597 000 Hz nominal
-6	1 594 000 Hz nominal

(5) In the '0' position of the DET-B.F.O. switch check that the B.F.O. TUNE control gives a frequency shift of not less than plus or minus 3 kHz.

(6) Remove the test equipment. Replace the cover on the module.

CAUTION: This chapter refers to audio power meter measurements on both the 10 mW 600Ω and the 1-watt 15Ω versions of the RA.1217. The user must ensure that the correct termination is used for the particular version of the receiver under test. If in doubt, refer to the Preface at the beginning of Chapter 1 for advice on audio amplifier identification.

Overall Receiver Sensitivity Check

NOTE: The audio power meter must be terminated in 15 ohms for a 1-watt receiver or in 600 ohms for a 10 mW receiver.

11. (1) Terminate the power meter in 600 ohms (10 mW output) or 15 ohms (1-watt output) and connect it to the audio output at pin D and pin C (screen) of the 12-way outlet 1SKT11.

(2) Connect the H.F. electronic voltmeter to the unterminated 1.6 MHz OUT socket. The length of cable between socket and voltmeter must not exceed 12 inches. (30 cms).

(3) Connect the Signal generator to the R.F. INPUT (Antenna) socket. Set the generator to 3.5 MHz modulated 30% at 400 Hz. Output level 1 μV e.m.f. from 75Ω source.

(4) Set the receiver controls as follows:-

(a) AE ATT to MIN.
(b) R.F. RANGE to 2-4 MHz.
(c) R.F. TUNE tuned to 3.5 MHz.
(d) DET - B.F.O. switch to A.M.
(e) R.F. GAIN fully clockwise (maximum gain).
(f) I.F. B.W. switch to 3.
(g) System switch to MAN.

(5) Tune receiver MHz and KHz controls to 3.5 MHz and make fine adjustments to obtain maximum output on the electronic voltmeter. Peak the R.F. TUNE control.

(6) Set the System switch to A.G.C. Med.

(7) Observe the maximum level indicated on the electronic voltmeter which should be not less than 60 mV.

(8) Adjust the A.F. GAIN control for maximum output on the power meter. Note the indicated level which should be not less than 10 mW into 600Ω or 1 watt into 15Ω.

(9) Transfer the electronic voltmeter to the 100 kHz OUT socket on the rear panel, the output to be terminated in 75 ohms. Note the output level as follows:-

(a) For 100 kHz output not less than 230 mV.

(10) Set the System switch to MAN.

Single-Signal Selectivity

12. (1) Set the RA.1217 controls as follows:-

(a) AE ATT to MIN.
(b) R.F. RANGE to 2-4 MHz.
(c) R.F. TUNE tuned to 3.5 MHz.
(d) I.F. B.W. switch to .2 (200 Hz).
(e) R.F. GAIN fully clockwise (maximum gain).
(f) DET-B.F.O. to A.M.
(g) System switch to MAN.

(2) Set the signal generator to 3.5 MHz, c.w. 1 μV e.m.f.

(3) Connect the digital frequency meter directly to the signal generator output and accurately tune the generator to 3.5 MHz. Remove the digital frequency meter and connect the signal generator to the receiver R.F. INPUT (Antenna) socket.

(4) Connect the H.F. electronic voltmeter to the 1.6 MHz OUT socket of the receiver.

(5) Connect the digital frequency meter in parallel with the electronic voltmeter using a sensitive probe.

(6) Tune the receiver to obtain the maximum indication of the electronic voltmeter. Note the output level obtained, as a reference.

(7) Decrease the frequency of the signal generator until the indication of the electronic voltmeter is 3 dB down relative to the reference level noted in (6). Note the frequency on the digital frequency meter.

(8) Increase the frequency of the signal generator above 3.5 MHz until the electronic voltmeter again indicates 3 dB down relative to the reference level noted in (6). Note the frequency on the digital frequency meter.

(9) Calculate the bandwidth by subtracting the frequency noted in (7) from that noted in (8). This shall be 200 Hz plus or minus 50 Hz.

(10) Repeat the procedure outlined in operations (2) to (9) for each setting of the I.F. BW. switch, setting the signal generator frequency accordingly. The limits shall be as specified below.

I.F. BW Setting	Minus 3 dB Bandwidth
3 kHz	3 kHz ±300 Hz
8 kHz	8 kHz ±800 Hz
1.2 kHz)	1.2 kHz ±120 Hz
6.0 kHz) if fitted	6.0 kHz ±600 Hz
13 kHz)	13 kHz ±1300 Hz

(11) Disconnect the electronic voltmeter and digital frequency meter.

Signal-to-Noise Ration (C.W. and S.S.B.)

13. (1) Connect the power meter (terminated in 600Ω for 10 mW or 15Ω for 1-watt) to the audio output (1SKT11 pins D and C).

(2) Connect the signal generator to the R.F. INPUT (Antenna) socket. Set the output to 1 μV e.m.f. and the frequency to 3.5 MHz.

(3) Set the receiver controls as follows:-

(a) R.F. RANGE to 2-4 MHz.
(b) AE ATT to MIN.
(c) I.F. BW to 3 kHz.
(d) DET-B.F.O. to USB.
(e) R.F. GAIN fully clockwise (max. gain).
(f) A.F. GAIN fully clockwise (max. gain).
(g) Set the System switch to MAN.

(4) Tune the receiver (including the R.F. TUNE) to obtain maximum a.f. output on the power meter.

(5) Set the System switch to A.G.C. "Med" and adjust the A.F. GAIN control until the power meter indicates a reference level of 10 mW into 600Ω or 1 watt into 15Ω according to the type of audio board fitted.

(6) Set the System switch to MAN and adjust the R.F. GAIN control to restore the power meter reading to the reference level noted in (5).

(7) Set the signal generator to CARRIER OFF.

(8) Note the power meter reading which should be not less than 15 dB below the reference level noted in (5).

(9) Set the R.F. RANGE switch to WB.

(10) Set the signal generator to CARRIER ON and increase the generator output to 15 μV.

(11) Repeat the procedures (6) to (9) inclusive.

Signal-to-Noise Ratio (M.C.W.)

14. On completion of the C.W. Signal-to-Noise check continue as follows:-

(1) Set the DET-B.F.O. switch to A.M.

(2) Set the System switch to MAN.

(3) Set the signal generator output to 30% modulation at 400 Hz at an e.m.f. of 3 μV.

(4) Set the R.F. RANGE to 2-4 and tune for a maximum output on the power meter.

(5) Set the System switch to A.G.C. "Med" and adjust the A.F. GAIN control until the power meter indicates a reference level of 10 mW into 600Ω or 1 watt into 15Ω according to the type of audio board fitted.

(6) Switch off the modulation at the signal generator. Note the power meter reading which should be at least 15 dB below the reference level noted in (5).

(7) Disconnect the power meter.

Gain/Frequency Characteristic

15. (1) Connect a signal generator to the R.F. INPUT (Antenna) socket. Set the signal generator to 1 MHz at 1 μV e.m.f. C.W. Maintain the generator e.m.f. at 1 μV throughout the tests.

(2) Connect the H.F. electronic voltmeter to the 1.6 MHz OUT socket using short leads.

(3) Set the receiver controls as follows:-

(a) AE ATT to MIN.
(b) R.F. RANGE to 1-2 MHz.
(c) R.F. GAIN fully clockwise (maximum gain).
(d) I.F. BW to 3.
(e) DET-B.F.O. to L.S.B.
(f) System switch to MAN.
(g) Meter switch to R.F.

(4) Tune the receiver (including R.F. TUNE) for a maximum output on the electronic voltmeter of not less than 60 mV. Note the actual reading obtained.

(5) Set the signal generator successively to the following frequencies (at 1 μV) and repeat operation (4). Record the readings obtained:-
1.5 MHz 2.0 MHz 3.0 MHz 4.0 MHz 6.0 MHz 12.0 MHz 16.0 MHz 24.0 MHz and 29.999 MHz.
Each output should be within a 12 dB range over the frequency band 1-30 MHz. The minimum level shall be not less than 35 mV and the maximum level not greater than 250 mV.

A.G.C. Characteristic Check

16. (1) Connect the signal generator to the R.F. INPUT (Antenna) socket.

(2) Set the signal generator to 10.5 MHz, modulation 30% at 400 Hz, e.m.f. 2 μV.

(3) Connect the power meter (terminated in 600Ω for 10 mW or 15Ω for 1 watt) to the audio output (1SKT11 pins D and C).

(4) Set the receiver controls as follows:-

(a) R.F. RANGE to 8-16 MHz.
(b) AE ATT to MIN.
(c) I.F. BW to 3.
(d) DET-B.F.O. to A.M.
(e) R.F. GAIN fully clockwise (maximum gain).
(f) System switch to MAN.

(5) Tune the receiver (including R.F. TUNE) to 10.5 MHz and adjust for maximum output on the power meter.

(6) Set the System switch to AGC Med.

(7) Adjust the A.F. GAIN control to provide a reference reading on the power meter of either 1 mW into 600Ω or 10 mW into 15Ω.

(8) Increase the signal generator output to plus 85 dB relative to 2 μV. Check that the power meter indication does not increase by more than +4 dB.

(9) Reset the signal generator to 2 μV and then repeat operation (8) in the AGC 'sh' and AGC 'lg' settings of the System switch.

(10) The power meter should remain connected for the Noise Factor check.

Noise Factor Check

17. (1) Connect the noise generator (75Ω source) to the R.F. INPUT (Antenna) socket. Do not switch on the noise generator.

(2) Connect the power meter (terminated in 600Ω for 10 mW or 15Ω for 1 watt) to the audio output (1SKT11 pins D and C).

(3) Set the receiver controls as follows:-

(a) AE ATT to MIN.
(b) System switch to MAN.
(c) DET-B.F.O. to U.S.B.
(d) I.F. BW to 3.
(e) R.F. GAIN fully clockwise (maximum).
(f) The R.F. RANGE and R.F. TUNE should be set to the appropriate settings for peak tuning at each test.

(4) Check that the noise generator is switched off. Set R.F. RANGE to 1-2 and tune the receiver (including R.F. TUNE) to 01.000 MHz. Carefully adjust the MHz control for maximum indication on the power meter and peak the R.F. TUNE control.

(5) Adjust the A.F. GAIN control for a powermeter reading of either 1mW (10mW receiver) or 100mW (one-watt receiver).

(6) Switch on the noise generator and increase its output until the power meter reading is increased by +3 dB. The increase in noise generator output (noise factor) to achieve this increase should not exceed 10 dB.

(7) Repeat operations (4), (5) and (6) at the following frequencies:
1.5 MHz 2.0 MHz 3.0 MHz 4.0 MHz 6.0 MHz 12.0 MHz, tuning the receiver to the appropriate range in each case.

(8) With the R.F. RANGE switch set to '16-32' repeat the procedures of (4), (5) and (6) checking that the noise factor does not exceed 12 dB at 16.0, 24.0 and 29.999 MHz.

(9) Disconnect the Noise Generator.

First Mixer Balance Check

18. CAUTION: Do not remove the cover from the 1st mixer and 40 MHz filter module. A suitable alignment hole is in the cover.

(1) Connect the signal generator to the R.F. INPUT (Antenna).

(2) Set the signal generator to 3.5 MHz, C.W., e.m.f. 15 μV.

(3) Connect the power meter (terminated in 600Ω for 10 mW or 15Ω for 1 watt) to the audio output (1SKT11 pins D and C).

(4) Connect the electronic voltmeter to the socket 1.6 MHz OUT.

(5) Set the receiver controls as follows:-

(a) AE ATT to MIN.
(b) R.F. RANGE to WB.
(c) DET-B.F.O. to U.S.B.
(d) I.F. BW to 3.
(e) R.F. GAIN fully clockwise (maximum gain).
(f) MHz tuning to 3 and KHz tuning to 500.
(g) Meter switch to A.F.
(h) System switch to MAN.

(6) Tune the receiver to a maximum reading on the power meter and adjust the A.F. CAIN control to obtain a reference level of 1mW (10mW receiver) or 100mW (one-watt receiver).

(7) Set the signal generator frequency to 20 MHz.

(8) Increase the signal generator output by plus 60 dB relative to 15 μV.

(9) Vary the signal generator tuning around the 20 MHz point until a maximum reading is obtained on the power meter.

(10) Balance the mixer by adjusting the potentiometer RV1 on the 1st Mixer board (Fig. L8) to obtain a minimum output on the power meter. Check that this minimum reading is not less than 60 dB down relative to the reference level noted in (6).

(11) Remove the signal generator.

Spurious Response to Internal Signals

CAUTION: Spurious responses can occur if module securing screws are slack or if covers are loose.

19. (1) Ensure that all module covers are secure also the top and bottom covers of the receiver.

(2) Connect the power meter (terminated in 600Ω for 10 mW or 15Ω for 1 watt) to the audio output (1SKT11 pins D and C).

(3) Disconnect and switch off the signal generator and terminate the R.F. INPUT (Antenna) socket with 75 ohms.

(4) Set the Receiver controls as follows:-

(a) AE ATT to MIN.
(b) R.F. RANGE to WB.
(c) DET-B.F.O. to U.S.B.
(d) R.F. GAIN fully clockwise (Maximum).
(e) I.F. BW to 3 kHz.
(f) System switch to MAN.
(g) Set the MHz and KHz tuning to 01.000 initially.

(5) Adjust the MHz tuning carefully for maximum noise level on the power meter.

(6) Adjust the A.F. GAIN control to obtain a noise level on the power meter of 1 mW into 600Ω or 100 mW into 15Ω.

(7) Turn the KHz tuning control slowly and carefully through its range from 000 to 999. When a spurious response is heard in the phones, offset the KHz tuning until the response is no longer audible and then adjust the A.F. GAIN control to restore the reference level noted in (6).

(8) Retune the Khz tuning to the spurious response and carefully tune to obtain a peak reading on the power meter.

(9) Note the increase in the power meter reading relative to the reference level obtained in (7). This increase should not exceed 3 dB.

(10) Repeat operations (5) to (9) at each setting of the MHz control from 02 up to 29.

(11) Repeat operations (5) to (9), with the R.F. RANGE set to the appropriate range, and the R.F. TUNE control adjusted to maximum noise setting at each MHz setting from 02 up to 29.

(12) On completion remove the 75Ω termination from the R.F. INPUT socket.

Spurious Response to External Signals

20. (1) Connect the signal generator to the R.F. INPUT (Antenna) socket.

(2) Set the signal generator to 3.5 MHz, C.W. 1 μV e.m.f.

(3) Connect the power meter (terminated in 600Ω for 10 mW or 15Ω for 1 watt) to the audio output (1SKT11 pins D and C).

(4) Set the receiver controls as follows:-

(a) AE ATT to MIN.
(b) R.F. RANGE to 2-4 MHz.
(c) DET-B.F.O. to L.S.B.
(d) R.F. GAIN fully clockwise.
(e) I.F. BW to 3 kHz.
(f) System Switch to MAN.

(5) Tune the receiver (including R.F. TUNE) to the signal generator frequency for a maximum power output.

(6) Adjust the A.F. GAIN control to obtain a reference reading on the power meter of either 1 mW for the 10 mW receiver or 100 mW for the 1 watt receiver.

(7) Set the signal generator to 3.55MHz and increase the signal generator output level to +70 dB. Make a very fine adjustment of the MHz control until a spurious frequency is heard. Lock the tuning controls at this point. (If locks are fitted).

(8) Tune the signal generator carefully from 3 MHz up to 4 MHz. If a spurious frequency is found, adjust the signal generator output to restore the appropriate reference level noted in (6). Check that such generator level settings are not less than 60 dB above 1 μV to provide the appropriate reference level.

(9) If a spurious response is located, which results in a signal generator level of less than 60 dB for the reference level reading on the power meter, proceed as follows:-

(i) Remove the cover from the 37.5 MHz Generator module.

(ii) Make a small adjustment of the potentiometer RV1 on the Harmonic Mixer board (Fig. L-7) to reduce the spurious response, as shown by a fall in the power meter reading.

NOTE: For access to the Harmonic Mixer board remove the cover from the 37.5 MHz Generator module.

(iii) Adjust the signal generator output level to obtain the reference level on the power meter (either 1 mW or 100 mW as appropriate). The signal generator level should be not less than 60 dB, in accordance with operation (8). If necessary make a further small adjustment of RV1 and repeat the test.

(iv) Replace the cover on the 37.5 MHz Generator module and the receiver cover.

(v) Repeat operation (8).

(10) Disconnect the signal generator and power meter.

CHAPTER 4

ALIGNMENT PROCEDURES

INTRODUCTION

1. The purpose of this chapter is to enable the modules of a receiver to be tested to a serviceable standard. The tests are designed to be as independent as is practicable, so that the checks on a particular module rely as little as possible on the correct functioning of another module, thereby providing a useful aid to the fault location chapter. If the user wishes to check the overall performance of the receiver, reference should be made to Chapter 3.

NOTE: Throughout this chapter the signal generator output level in each test is given as e.m.f. unless otherwise stated. All r.f. voltages are r.m.s. unless otherwise stated.

CAUTION: Under normal conditions the receiver will maintain the factory alignment over a long period of time, consequently any other causes of trouble should be eliminated before re-alignment is undertaken. If it becomes necessary to re-align any part of the receiver, only small angular adjustments of any trimmers or tuning slugs should be necessary. When replacing access covers, module shields, etc., ensure that all screws are firmly secured to prevent any spurious signals from affecting the receiver, but do not overtighten, to the extent that screw-hole threads become damaged.

PROCEDURES

AUDIO AMPLIFIER BOARD

(1 watt Version)

Test Equipment

3. Multimeter: 20 000 ohms/volt. (AVO 8).
Soldering Iron.

Initial Control Settings

4. R.F. GAIN and A.F. GAIN fully anti-clockwise (minimum).

Setting Procedure

5.
(1) Remove the metal panel from the underside of the receiver.

(2) Set the multimeter to the 25 volt d.c. range:
Connect the -ve lead to pin 5 on the audio amplifier board and the +ve lead to chassis.

(3) Set the System switch to MAN.

(4) Adjust the potentiometer RV1 on the audio board for a reading of -8 volts on the multimeter.

(5) Set the System switch to OFF and unsolder the h.t. (violet) lead from pin 6 of the board.

(6) Set the multimeter to the 100 mA d.c. range and connect in series with pin 6 and the disconnected h.t. lead. (+ve lead to pin 6).

(7) Set the System switch to MAN and adjust potentiometer RV2 on the board for a reading of 55 mA on the multimeter.

(8) Set the System switch to OFF.

(9) Remove the multimeter and re-solder the h.t. lead to pin 6.

(10) Repeat operations (2), (3) and (4), adjusting RV1 if necessary.

(11) Remove the test equipment and replace the metal panel.

AUDIO AMPLIFIER BOARD

(10 mW Version)

There are no adjustments in the 10 mW audio amplifier board. Refer to Chapter 3 paragraph 11 for a check procedure. If the 10 mW level cannot be obtained in operation (8) of that paragraph it will be necessary to employ basic servicing methods to find the cause of low output.

I.F. MODULE

Test Equipment

6. Signal Voltmeter.
D. C. Voltmeter.
Electronic Voltmeter.
Digital Frequency Meter.
Power Meter: (600Ω for 10 mW or 15Ω for 1 watt measurements).
0.1 μF Capacitor 30V rating.

Initial Control Settings

7. R.F. GAIN - Fully clockwise.
A.F. GAIN - Fully clockwise.
System switch - MAN.
DET - B.F.O. switch - A.M.
BANDWIDTH - 3 kHz.

Alignment Procedure

Fig. L-12 Fig. 12 Fig. 18

CAUTION 1: Coaxial Test connections to the 1.6 MHz OUT socket at the rear panel must be short. (Not longer than 12 inches, 30 cm).

CAUTION 2: Note the alternative terminations for the 10 mW (600Ω) and 1 watt (15Ω) audio outputs. The user must determine which one is appropriate for the particular receiver under test.

NOTE: To make tests and adjustments within the I.F. Module the module cover and the receiver sideplate must be removed. Refer to Chapter 7 page 7-2 for removal instructions.

8. (1) Disconnect the coaxial input lead from the socket SKT4 at the forward end of the i.f. module.

(2) Connect the electronic voltmeter to the rear panel socket 1.6 MHz OUT using a short lead.

(3) Connect the D.C. voltmeter (10V range) to pin 3 on the I.F. Amplifier board (-ve lead).

(4) Adjust potentiometer RV1 on the A.G.C. board to produce a reading of -4 volts on the voltmeter.

(5) Set the signal generator to 1.6 MHz ±10 Hz at an e.m.f. of 40 microvolts. Connect the generator to the i.f. input, SKT4 at the forward end of the I.F. Module.

(6) Note the 1.6 MHz output level on the electronic voltmeter which should be between 80 and 150 mV. If below 80 mV, align the coils in the following order for maximum output on the electronic voltmeter.

L1 on the A.G.C. board.
L2 and L1 on the I.F. Amplifier board.

I.F. Module (Continued)

(7) Terminate the audio output (SKT11 pins D and C) in 600Ω (10 mV) or 15Ω (1 watt) and connect the power meter.

(8) Set the signal generator to 1.6 MHz modulated 30% at 1000 Hz, and check that the audio output is not less than 10 mW (or 1 watt). (A.F. GAIN fully clockwise).

(9) If the 10 mW (or the 1 watt) indication is not obtained, adjust the cores L3 on I.F. Amplifier board and T1 on the Detector board to obtain such an indication on the Power meter.

(10) Switch off the modulation and set the DET - B.F.O. switch to L.S.B. and U.S.B. in turn. Note that the Power meter reads at least 10 mW (or 1 watt) in each setting.

(11) Set the DET - B.F.O. switch successively to the positions +6 through to -6 and note that the 10 mW (or 1 watt) output is obtained in each setting.

(12) Set the DET - B.F.O. switch to A.M. and the System switch to A.G.C. 'Sh'.

(13) Increase the signal generator output level by +36 dB. Observe the change of reading on the electronic voltmeter which should not exceed +3 dB. If the indication is satisfactory, omit the next operation.

(14) If, in operations (13) the electronic voltmeter reading showed an increase of more than 3 dB adjust L2 in the A.G.C. board to produce a minimum level in the electronic voltmeter reading.

(15) Re-set the signal generator output according to operation (5).

(16) Terminate the 100 kHz OUT socket in 75 ohms. Connect the electronic voltmeter across the termination. For a 1.6 MHz 40 microvolt input to the i.f. unit the output should be not less than 230 mV into 75 ohms at 100 kHz. If the output is low adjust L1 on the converter amplifier board. If necessary adjust L2 and L1 on the converter oscillator board.

CAUTION: Peaking of the converter board inductors can adversely affect the selectivity characteristics. Set the I.F. BW switch to the widest bandwidth and tune the signal generator through the receiver passband; note that the response is symmetrical.

I. F. Module (Continued)

(18) Connect the digital counter to the 1. 7 MHz IN/OUT socket (1. 145 MHz OUT). Check the appropriate frequency. If necessary adjust C4 on the oscillator board to obtain the required frequency ±2 Hz.

(19) Remove the counter and connect the electronic voltmeter in its place. A reading of not less than 100 mV should be obtained.

B. F. O. Check

NOTE: Refer to Chapter 3 page 3-8 para. 10 for calibration check. If necessary align as follows:-

9. (1) Connect a digital counter to test point TP1 on the detector board in the I. F. Module via a 0. 1 μF capacitor.

(2) Set the System switch to MAN.

(3) Set the B. F. O. TUNE control to the mid-point of its movement. (Capacitor vanes at half-mesh).

(4) Set the B. F. O. KHz switch to L. S. B. The counter should read 1601. 50 kHz ±2 Hz. If necessary adjust the Trimmer capacitor C21 on the Detector board to obtain the correct frequency.

(5) Set the DET - B. F. O. switch to U. S. B. The counter should read 1598. 50 kHz ±2 Hz. If necessary adjust Trimmer capacitor C22 on the Detector board to obtain this frequency.

(6) Set the DET - B. F. O. switch to +6. Refer to Fig. L-13 and Fig. 18 to identify B. F. O. board. Adjust coil L1 in the B. F. O. board for a frequency of 1. 606 000 Hz, plus or minus 100 Hz.

(7) Set the DET - B. F. O. switch and adjust the appropriate capacitor on the 600 kHz B. F. O. board, to an accuracy of ±100 Hz as follows:

B. F. O. Switch Setting	Capacitor to Adjust	Frequency (Hz)
+3	C2	1 603 000
0	C3	1 600 000
-3	C5	1 597 000
-6	C6	1 594 000

(8) Remove all test equipment.

(9) Leave the coaxial input lead to the i. f. unit (PL3) disconnected for the 3rd Mixer check which follows.

3RD MIXER

Test Equipment

10. Two Signal Generators with frequency ranges up to 6 MHz and 4 MHz respectively.
Electronic Voltmeter.

Initial Control Settings

11. System Switch - MAN
2nd V. F. O. Switch – EXT
MHz Tuning - set to 00 MHz
CAL-FINE TUNE Control - Mid-position of its travel

Alignment Procedure Fig. L-11, Fig. 11

12.
(1) Connect the signal generator to the 2nd V. F. O. IN socket on the rear panel.

(2) Connect the electronic voltmeter to test point TP2 on the 3rd Mixer board.

(3) Set the Signal Generator to 5. 6 MHz and set the attenuator on the generator for a convenient reading on the electronic voltmeter (50 mV).

(4) Tune coil L4 for a minimum on the electronic voltmeter.

(5) Set the generator to 3 MHz and tune L6 for minimum on the electronic voltmeter.

(6) Set the generator to 3. 6 MHz and tune L7 for maximum on the R. F. voltmeter.

(7) Set the generator to 4. 6 MHz and tune L2 for maximum on the electronic voltmeter.

(8) Repeat the above procedures until the response is flat within 3 dB from 3. 6 to 4. 6 MHz.

(9) Transfer the signal generator to the socket L. F. on the rear panel.

(10) Connect the electronic voltmeter to pin 1 on the 3rd Mixer board.

(11) Set the generator to 3 MHz and set the generator output for a 50 mV reading on the electronic voltmeter.

(12) Tune coil 1L1 on the 3rd Mixer for maximum reading on the electronic voltmeter.

(13) Tune the generator from 2 MHz to 3 MHz and check that the output remains constant within 2 dB.

3rd Mixer (Continued)

(14) Transfer the signal generator from the L. F. socket to pin 3 on the 2nd MIXER board. Set the generator accurately to 2.4 MHz ±10 Hz. Adjust the generator output level to a p.d. of 10 mV measured at pin 3 on the 2nd Mixer board.

(15) Connect a second signal generator to the 2nd V. F. O. IN socket on the rear panel. Set this generator accurately to 4 MHz ±10 c/s and an e.m.f. of 100 mV.

(16) With the input lead at the forward end of the I. F. Unit (PL3) disconnected, terminate the lead in 100 ohms. Connect the electronic voltmeter across the termination.

(17) On the 3rd Mixer board tune coils L5 and L3 for maximum reading on the electronic voltmeter.

(18) Check that a stage gain of not less than unity is obtained (calculated from the p.d. at pin 3 on the 2nd Mixer to the p.d. at the 100 ohm termination). Normally the gain is approximately + 20dB.

(19) Remove the test equipment. Reset the 2nd V. F. O. switch to INT.

2ND MIXER

Test Equipment

10. Two Signal Generators, each with a frequency range up to 40 MHz. Electronic Voltmeter.

Initial Control Settings

11. System switch - MAN.
MHz tuning - Set to indicate 00 MHz, to disable 1st V.F.O. etc.

Alignment Procedure

Fig. L-9 Fig. 9

12. (1) Remove the 1 MHz crystal from the 1 MHz module. (Fig. L-7). Connect the electronic voltmeter to TP2 on the 2nd Mixer board. Connect the signal generator to pin 1.

(2) Set the signal generator to 37.5 MHz and an e.m.f. of 10 mV.

(3) Tune coil T1 for maximum on voltmeter. The electronic voltmeter should indicate approximately 100 mV.

(4) Connect the electronic voltmeter to pin 3.

(5) Transfer the signal generator to the socket LF on the rear panel.

(6) Set the signal generator to 2.5 MHz and adjust the generator output level for a convenient reference level (say 30 millivolts) on the electronic voltmeter.

(7) Carefully sweep the signal generator through the range 2 MHz to 3 MHz, at the same time noting the electronic voltmeter readings. Check that the response obtained is flat within 3 dB. The following filter data will assist adjustment should this be necessary.

CAUTION: Do not attempt to re-align the 2nd Mixer filters unless absolutely essential.

FILTER FREQUENCIES

L1 .. 2 to 3 MHz	L4 .. 2 to 3 MHz
L2 .. 3.66 MHz (rejection)	L5 .. 4.5 MHz (rejection)
L3 .. 1.6 MHz (rejection)	L6 .. 1.3 MHz (rejection)

T1 .. 2 to 3 MHz

(8) Disconnect the signal generator.

2nd Mixer Check

(9) Two signal generators are required for the following Mixer test. Connect signal generator No. 1 to pin 1 of the 2nd Mixer board. Set the generator to 37.5 MHz at an e.m.f. of 10 mV.

(10) Set signal generator No. 2 to 40 MHz and connect to pin 6 of the 2nd Mixer board. Adjust this generator for a p.d. of 10 mV measured at pin 6.

(11) Connect the electronic voltmeter to pin 3 (output) of the mixer board and check that a reading of 10 mV ± 3 dB is obtained.

(12) Disconnect all test equipment.

(13) Re-fit the 1 MHz crystal to the 1 MHz module.

37.5 MHz GENERATOR MODULE

1 MHz AMP, OSCILLATOR AND CALIBRATOR SECTION

Test Equipment

16. Signal Generator with a frequency range at least to 37.5 MHz.
Electronic Voltmeter
Digital Frequency Meter (Counter)
Oscilloscope

Initial Control Settings

17. System Switch - MAN

Alignment Procedure Fig. L-6 Fig. 6

NOTE: The 1 MHz and Calibrator Section is on the upper deck of the module. Refer to the illustration in Fig. L-7.

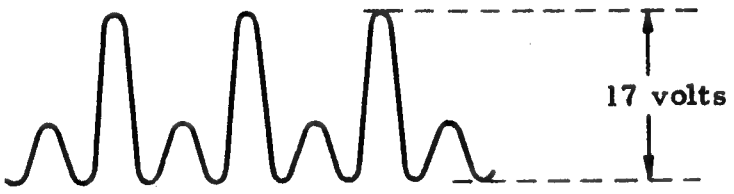
18. (1) Check that the 1 MHz crystal is secure in its holder on the oscillator board.

(2) Connect the electronic voltmeter to the rear panel socket '1 MHz OUT' and check for a reading of approximately 100 mV.

(3) Connect the counter to the '1 MHz OUT' socket. The frequency should be 1 MHz ±2 Hz. If necessary adjust capacitor C7 on the oscillator board to achieve the required frequency.

(4) Connect the oscilloscope to the junction of C12 and R17 on the amplifier board.

(5) Adjust the coil L1 on the amplifier board for maximum amplitude which should be approximately 17 volts. The approximate waveform is shown below



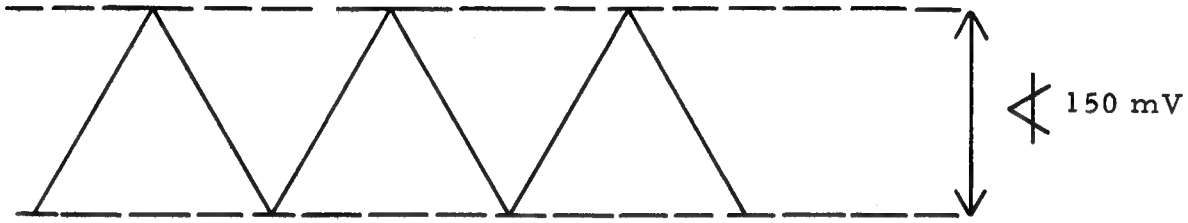
(6) Remove the 1 MHz Crystal from its holder on the oscillator board.

(7) Connect the signal generator to the '1 MHz IN' socket. Set the signal generator to 1 MHz and 100 mV e.m.f.

(8) Transfer the electronic voltmeter to the junction of C4 and C5 on the oscillator board and check for a reading of approximately 100 mV.

(9) Replace the crystal. Disconnect the signal generator and electronic voltmeter.

(10) Connect the oscilloscope to the -ve side of diode D1 (pin A2). The output waveform display should be as shown below.



(11) Remove the test equipment and proceed with a check of the lower deck of the module. Switch off the receiver.

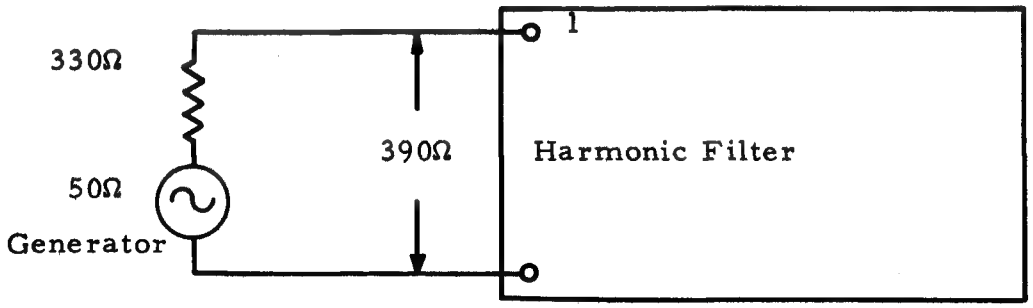
HARMONIC GENERATOR, MIXER AND 37.5 MHz AMPLIFIER

19. Refer to Fig. L-7 and to Chapter 7 for access instructions.

(1) Disconnect the Harmonic Filter from the Harmonic Generator by unsoldering the lead from pin 1 on the Harmonic Filter.

(2) Connect the electronic voltmeter to pin 2 on the Harmonic Mixer board.

(3) Connect a signal generator, source impedance 390 ohms to pin 1 of the Harmonic Filter. See diagram below.



(4) Set the signal generator output to 2 volts e.m.f. Explore the passband of the Harmonic Filter from 1 MHz to 32 MHz. The ripple should not exceed 3 dB. If necessary adjust capacitors C2, C4, C6 and C8 in the Harmonic Filter for minimum ripple.

(5) Set the signal generator to 33 MHz and check that the output is 8 dB down relative to the level at 32 MHz.

(6) Disconnect the signal generator and electronic voltmeter. Reconnect the lead unsoldered in (1). Switch on the receiver.

(7) Connect the oscilloscope to pin 1 of the Harmonic Generator board. The waveform and amplitude should be as measured in para. 18 operation (5) (approx. 17V p-p).

(8) Transfer the oscilloscope to pin 2 of the Harmonic Mixer board. The amplitude should be approx. 1.2V peak-to-peak.

(9) Transfer the electronic voltmeter to pin 5 on the Harmonic Mixer board.

(10) Connect the signal generator to pin 4 on the Harmonic Mixer board.

(11) Set the signal generator to 37.5 MHz at 2 mV e.m.f.

(12) Tune coil L1 in the Mixer to a maximum reading on the electronic voltmeter which should indicate approximately 10 mV.

(13) Transfer the electronic voltmeter to pin 4 on the 37.5 MHz Amplifier and adjust T1 on the amplifier for maximum indication. A level of approximately 100 mV should be obtained.

(14) At the bracket on the underside of the receiver disconnect the lead which goes to the 37.5 MHz Generator module (Fig. 18). Connect the signal generator output to this lead and inject 37.5 MHz at an e.m.f. of 20 mV.

(15) Connect the electronic voltmeter to pin 5 on the Harmonic Mixer board. Adjust RV1 on the Mixer board for a <u>minimum</u> reading on the electronic voltmeter.

1ST MIXER

Test Equipment

20. Two Signal Generators 3.5 MHz and 43.5 MHz
Electronic Voltmeter.

Initial Control Setting

21. MHz Tuning - 03.

Alignment Procedure

22. (1) Disconnect the two free coaxial leads which feed the 1st Mixer from their connections to the R.F. Module and 1st V.F.O. (1st V.F.O. connection is at a bracket on the underside of the receiver, see Fig. 18)

(2) Connect signal generator No. 1 to PL1 on the 1st Mixer lead normally fed from the R.F. Unit. Set this generator to 3.5 MHz at a p.d. of 10 mV, measured at pin 2 on the 1st Mixer board.

(3) Connect signal generator No. 2 to PL3 on the 1st Mixer lead which is normally fed from the 1st V.F.O. (underside of the receiver). Set this generator to 43.5 MHz at an e.m.f. of 200 mV.

(4) Connect the electronic voltmeter to pin 6 on the 2nd Mixer board.

(5) Set the System switch to MAN and check that the electronic voltmeter reads 10 mV ±3 dB.

FILTERS

23. No information is given on the alignment of the 40 MHz or the 37.5 MHz Bandpass Filters because it is considered that the equipment and specialized skill required for satisfactory alignment of these filters is outside the scope of the average service department. A factory aligned unit should be fitted in the unlikely event of a defect in either of these units.

2ND V.F.O.

Test Equipment

24. Digital Frequency Meter (Counter)
Electronic Voltmeter

Procedure

NOTE: The 2nd VFO cover need not be removed.

25. (1) Refer to Chapter 3 page 3-6 and perform the KHz Tuning Calibration Check in paragraph 8. If the frequencies are not correct make fine adjustment of C4, accessible through a hole in the module cover.

(2) Connect the electronic voltmeter to the '2nd VFO OUT' socket on the rear panel across a 75 ohm termination. A level of 50 mV should be obtained.

(3) Transfer the electronic voltmeter to the test point TP2 in the 3rd Mixer module (Fig. 11). A level of not less than 50 mV should be obtained.

1ST V.F.O.

Test Equipment

26. Digital Frequency Meter (Counter)
Electronic Voltmeter

Initial Control Settings

27. MHz Tuning - not set to '00'

Procedure

28. (1) Refer to Chapter 3 and perform the MHz Tuning Calibration Check in paragraph 9.

(2) The 1st V.F.O. output check is described in Chapter 5 page 5-4 operation (5).

Test Equipment

29. Electronic Voltmeter
Signal Generator (75 ohms source)
DC Voltmeter
Coil Trimmer Tool (supplied with the receiver)

Initial Control Settings

30. System Switch - MAN
MHz Tuning - not on 00 MHz
RF RANGE - Wideband (WB)
AE ATT - Minimum (MIN)
RF Gain Control - Maximum (fully clockwise)

Antenna Filter Alignment

31. The filter alignment is unlikely to need attention. The procedure is described in para. 36 for use if needed as part of a major overhaul.

Aerial Attenuator (AE ATT) Check Fig. 4 Fig. L-4

32. (1) Set the receiver controls according to para. 30 above.

(2) Check that approximately -4 volts is present on the a. g. c. line. (measure at microswitch 1SA).

(3) Disconnect the 1st Mixer lead from the outlet (SKT2) on the R. F. Module.

(4) Connect the electronic voltmeter across the outlet SKT2.

(5) Set the signal generator to 3. 5 MHz and connect the out put to the R. F. INPUT (Antenna) socket.

(6) With the receiver AE ATT control set to MIN, adjust the signal generator output for a suitable dB reference on the electronic voltmeter. Note the signal generator and voltmeter levels.

(7) Set the AE ATT control one step towards MAX.

(8) Increase the signal generator output to restore the reference level established in (6).

(9) Note the increase in signal generator output, which should be 10 dB ±2 dB.

(10) Repeat operations (6), (7) and (8). The increase in attenuation obtained at each setting of the AE ATT control should be as follows:

R. F. Module (Continued)

AE ATT Switch Setting		Change in Attenuation	
5	MIN	0 dB	(Reference)
4		-10 dB	±2 dB
3		-20 dB	±2 dB
2		-30 dB	±2 dB
1	MAX	-40 dB	±2 dB

Coil and Capacitor Assembly Alignment

NOTE 1: The cores of coils 2L1 to 2L5 and capacitors 2C1 to 2C5 can be adjusted via holes in the receiver rear panel. Remove the plate marked "R. F. INPUT" to obtain access.

NOTE 2: A special double-ended plastic trimming tool is supplied with the receiver for the adjustment of 2L1 to 2L5. Note that the longer and thinner end of the tool must be used for this adjustment.

33. (1) Remove the cover from the R. F. Module.

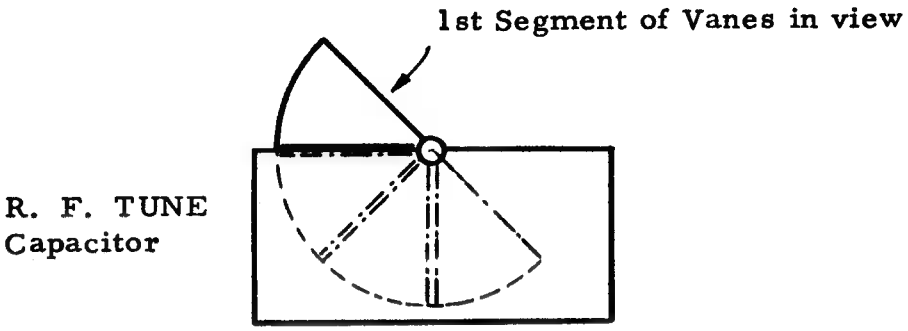
(2) Using the plastic trimming tool set all coil cores, 2L1 to 2L5, to the extreme ends of the coil formers.

(3) Set the trimmer capacitors 2C1 to 2C5 to the fully withdrawn position (minimum capacitance).

(4) Connect the signal generator (75Ω source) to the R. F. INPUT (Antenna) socket.

(5) Connect an electronic voltmeter to the R. F. Module output. (SKT2 on the side of the unit). Set the voltmeter initially to the 10 mV range.

(6) Set the R. F. TUNE control fully anti-clockwise and then turn clockwise about 45 degrees so that the knifing slot of the first segment of the vanes is aligned with the edge of the static vanes. (see illustration opposite)The dot on the R. F. TUNE control should coincide with the 1 MHz engraving on the scale.



(7) Set the signal generator to a frequency of 1.0 MHz at an e.m.f. of 3 mV.

(8) Set the receiver controls as follows:

System switch - MAN
R.F. RANGE - '1-2'
R.F. GAIN - maximum clockwise
AE ATT - MIN
MHz tuning - not on '00'.

(9) Check that approximately -4 volts is present on the a.g.c. line.

(10) Re-fit the cover to the R.F. Module.

(11) Insert the trimming tool into the core aperture of 2L1. Engage the secondary core which is at the end nearer to the rear of the receiver. Check that the core is fully anti-clockwise, then screw the core slowly clockwise for a maximum indication on the electronic voltmeter. The core must be set to the first tuning point obtained. Adjust the voltmeter range as necessary.

(12) Push the trimming tool right through to the further end to engage the primary core. Check that the core is fully clockwise, then slowly screw the core inwards (anti-clockwise) to obtain a maximum voltmeter reading at the first tuning point. The primary tuning is fairly insensitive and close attention is required to observe the resonant point.

(13) Set the signal generator to 2.0 MHz.

(14) Adjust the R.F. TUNE control for a maximum indication on the electronic voltmeter and adjust the trimmer capacitor 2C1 for a maximum voltmeter reading. Note this maximum reading as a reference.

(15) Tune the signal generator as follows and note the output readings obtained.

(a) 1.8 MHz

(b) 2.2 MHz

The voltage ratio at resonance (operation 14) relative to the off-tune readings in (a) or (b) should be not less than 6 to 1.

(16) Set the signal generator to 1.5 MHz.

(17) Adjust the R. F. TUNE control for a maximum indication on the electronic voltmeter and note this reading as a reference. Check that the R. F. TUNE control cursor lies within the scale calibration marks.

(18) Set the signal generator as follows and note the output readings obtained.

(a) 1.65 MHz
(b) 1.35 MHz

The voltage ratio at resonance (operation 17) relative to the off-tune readings in (a) and (b) should be not less than 6 to 1.

(19) Set the signal generator to 1.0 MHz and repeat the procedure of (17).

(20) Repeat the procedure of (18) at signal generator frequencies of 900 kHz and 1.1 MHz.

(21) Align the remaining circuits, that is the 2-4 MHz, 4-8 MHz, 8-16 MHz and 16-30 MHz ranges, as described in operations (6) to (20) but using the frequencies specified in the following alignment table. Set the R. F. RANGE control as stated in the left hand column. The right hand column is available for the tester to insert the readings obtained. The voltage ratio of the resonance reading relative to the 'off-tune' readings must in all cases be not less than 6:1

Refer to the alignment table on the next page

ALIGNMENT TABLE

Coil and Capacitor Assembly

R. F. Range Setting	Signal Generator Setting	Adjust	Output Readings Obtained
2 - 4 MHz	2.0 MHz	2L2	
"	4.0 MHz	2C2	
"	3.6 MHz and 4.4 MHz		
"	3.0 MHz		
"	2.7 MHz and 3.3 MHz		
"	2.0 MHz		
"	1.8 MHz and 2.2 MHz		
4 - 8 MHz	4.0 MHz	2L3	
"	8.0 MHz	2C3	
"	7.2 MHz and 8.8 MHz		
"	6.0 MHz		
"	5.4 MHz and 6.6 MHz		
"	4.0 MHz		
"	3.6 MHz and 4.4 MHz		
8 - 16 MHz	8.0 MHz	2L4	
"	16.0 MHz	2C4	
"	14.4 MHz and 17.6 MHz		
"	12.0 MHz		
"	10.8 MHz and 13.2 MHz		
"	8.0 MHz		
"	7.2 MHz and 8.8 MHz		
16 - 30 MHz	16.0 MHz	2L5	
"	30.0 MHz	2C5	
"	27.0 MHz and 33.0 MHz		
"	24.0 MHz		
"	21.6 MHz and 26.4 MHz		
"	16.0 MHz		
"	14.4 MHz and 17.6 MHz		

R. F. Amplifier Alignment

34. (1) Refer to paragraph 32 and set up the receiver and test equipment according to operations (1) to (4). The signal generator level should be set to 3 mV.

(2) Sweep the signal generator across the 1 to 30 MHz passband, note the electronic voltmeter readings and check that the response does not vary by more than 6 dB. If necessary adjust coils 3L1, 3L2, 3L3 and 3L4 on the amplifier board for minimum undulation in the passband.

R. F. Amplifier A. G. C. Adjustment

35. (1) The signal generator and electronic voltmeter should be connected as in paragraph 32. Set the signal generator to 5.5 MHz, c.w., 10 mV e.m.f.

(2) Check that the System switch is at A. G. C. Med.

(3) Connect a d.c. voltmeter -ve lead to the collector of 3VT1 (Fig. L-4).

(4) Adjust potentiometer 4RV1 (which is on the Filter component board mounted on the underside of the receiver) until the collector voltage of 3VT1 just 'bottoms'. A reference to the electronic voltmeter reading should show that the bottoming point of 3VT1 coincides with maximum r.f. gain. Refer to Chapter 1 paragraph 34 for a description of the procedure.

(5) Disconnect the signal generator and electronic voltmeter. Reconnect the 1st Mixer lead to the R. F. Module.

Antenna (0-30) MHz Filter Alignment

NOTE: This alignment should not normally be required and should be considered only as part of a major overhaul.

36. (1) Connect the electronic voltmeter to the output lead of the 0-30 MHz filter.

(2) Connect the signal generator (75Ω source) to the R. F. INPUT (Antenna) socket. Set the generator to 40 MHz and an e.m.f. of 1 volt.

(3) Adjust the coil 1L1 for a minimum reading on the electronic voltmeter.

(4) Set the signal generator to 56 MHz and adjust coil 1L2 for a minimum reading on the electronic voltmeter.

(5) Set the signal generator to 43 MHz and adjust coil 1L3 for a minimum reading on the electronic voltmeter.

(6) Sweep the signal generator frequency from 1 to 30 MHz. Observe the electronic voltmeter readings and check that the response does not vary by more than $1\frac{1}{2}$ dB.

(7) Remove the test equipment.

CHAPTER 5

FAULT LOCATION

INTRODUCTION

1. This chapter provides fault location advice at two levels. Paragraphs 2 to 11 assume that the only test equipment available is a universal test meter (Multimeter). The object being to locate an elementary fault. Paragraphs 12 to 16 assume the use of additional test equipment, and will direct the user to the appropriate paragraphs in Chapter 4 (Alignment).

PRELIMINARY CHECKS

2. If the receiver is newly installed check the following items:

(a) AC/DC selector switch correctly set. (rear panel).

(b) 2nd V. F. O. switch set to INT (front panel).

(c) MHz tuning control not set to '00'.

(d) Power connection: Note that the polarity of a d. c. supply must be correct. (Refer to Chapter 2).

(e) Antenna connected.

INITIAL FAULT LOCATION PROCEDURE

Controls

3. Set the receiver as follows and check for signal or noise.

(1) System switch to MAN.

(2) DET - B. F. O. switch to A. M.

(3) Meter switch to R. F.

(4) A. F. GAIN to maximum (clockwise)

(5) R. F. GAIN to maximum (clockwise)

(6) I. F. BW Switch to 3 kHz

(7) AE ATT control to the MINIMUM position (MIN)

(8) R. F. RANGE switch to "WB"

(9) Ensure that the MHz tuning control is not set to '00'.

Basic Diagnosis

4. The most useful indication in elementary fault diagnosis is receiver noise, or 'mush'. The controls should be set as listed in paragraph 3 and the receiver tuned over a suitable portion of the h. f. band. At each step of the MHz tuning control make a fine adjustment and listen for a rise in receiver noise level. If no noise can be heard, check that the phones are serviceable and, if possible, listen at an alternative audio outlet as well as at the phones jack socket. Note the receiver meter reading. If a reading is obtained, reduce the R. F. GAIN and the meter should deflect to the right. This indicates that the h. t. supply and a. g. c. line are normal.

POWER CHECK

5. If the receiver appears dead (no noise or meter reading) and the dial lights are not illuminated, check the H. T. fuse and then measure the -16 volts h. t. at one of the following points:

(a) On the terminal block TB3 at the pin adjacent to the Fine Tune potentiometer (Fig. 18).

(b) At the centre tag of the 2nd V. F. O. EXT/INT switch.

(c) At the microswitch 1 SB. The centre tag is the h. t. feed to the receiver front end. The reading should be present in all settings of the MHz control except '00'. When '00' is selected the reading appears on the top tag. It should be present on the bottom tag in all modes of operation.

(d) The rear panel terminal H. T. R. F. should give a -16 volt reading except when the MHz control is set to '00'.

GENERAL CHECK

6. (1) Set the receiver controls according to paragraph 3.

(2) Set the System switch to CHECK B. F. O. and rotate the DET - B. F. O. MODE switch through all settings. Select +6 to -6 and rotate the B. F. O. variable control. Listen for the b. f. o. heterodyne whistle and observe the receiver meter indications. These indications can be used for diagnosis as indicated in the following Table.

TABLE 1

"CHECK B. F. O. " INDICATIONS

Meter Indication Observed	B. F. O. Whistle Audible	Diagnosis
(a) Yes	Yes	Receiver is serviceable from 3rd Mixer input through to audio output. Also 1 MHz is functioning.
(b) Yes	No	Fault probably in detector board of I. F. Module (Fig. 12) or audio amplifier board or connections. (Fig. 14).
(c) No	No	Possible areas of fault are:- (a) 1 MHz reference (Fig. 6) (b) 1st i. f. amplifier unit (Fig. 11) (c) Main i. f. amplifier board of I. F. Module (Fig. 12). (d) Transistor stage VT3 in 3rd Mixer (Fig. 11).

7. If both whistle and meter reading are obtained in CHECK B. F. O. set the System switch to CAL. If no calibration whistles are obtained as the kHz tuning is rotated, it suggests a fault in the 2nd V. F. O. or the mixer stage of the 3rd Mixer.

8. If the CHECK B. F. O. and CAL tests are satisfactory, set the controls as listed in paragraph 3 and make a front end check as follows:-

FRONT END CHECK

9. Set the DET - B. F. O. switch to A. M. Listen intently and slowly rotate the MHz tuning control. If a very slight rise in noise level can be heard as the MHz tuning passes through each resonant point it suggests that the 37. 5 MHz loop is functioning and therefore the fault is more likely to be in the antenna circuit, R. F. Module or 1st Mixer. Make the check in the WB setting of the R. F. RANGE switch as well as in the tuned antenna condition (adjust R. F. TUNE control). Thoroughly check all front end connections as follows:

(1) Check Antenna

(2) Check continuity through the 500 mA fuselink in the R. F. Module.

(3) Ensure that the muting relay is not energized. Touching an earth to pin G of the 12-way socket on the rear panel should cause the relay to operate. At the same time listen for any change of noise level.

(4) Check the connections between the R. F. Module and 1st Mixer (on the side of the R. F. Module).

10. If, when tuning the MHz control as described in the previous paragraph, no noise can be heard, the 1st V. F. O. or its connections may be faulty. Check connections from 1st V. F. O. to 1st Mixer and 37. 5 MHz Generator respectively at the bracket on the underside of the main chassis. Ensure that they are not reversed.

R. F. H. T. Check

11. On the terminal block TB1 at the rear of the receiver connect the terminal H. T. R. F. to the terminal H. T. L. F. If the receiver then functions correctly the microswitch 1SB (Fig. 16, Fig. 18) should be checked. Make a voltage check at the microswitch (centre tag).

1 MHz Check

12. Set the System switch to CAL and tune the KHz control to the 100 kHz calibration check frequencies. If the calibration whistle is heard at each point it indicates that the 1 MHz reference is functioning. If no calibration whistles are heard, turn the System switch to CHECK B. F. O. and set the DET - B. F. O. switch to +6, +3, -3 and -6 kHz in turn. If, again.

no heterodyne whistles are heard, it indicates a faulty 1 MHz crystal oscillator. Check that the crystal is correctly fitted in the upper deck of the 37.5 MHz Generator Module. If test equipment is available check with an electronic voltmeter for an e.m.f. of 100 mV at the rear panel socket "1 MHz OUT".

A.G.C. FAULT

13. If the receiver operates satisfactorily with manual r.f. gain control (System switch to MAN) but overloads on strong signals in the a.g.c. settings of the System Switch check as follows:

(1) Tune the receiver to a strong signal. Set the System switch to A.G.C. Med and the Meter switch to R.F. If the meter indicates a reading appreciably greater than 1 microvolt the a.g.c. board in the I.F. Module is serviceable. If no reading is obtained the fault is probably in the I.F. Module.

(2) If the meter reading is satisfactory, connect the test meter negative lead to the terminal A.G.C. R.F. on the rear panel (positive lead to chassis). As the receiver is tuned through a powerful signal the a.g.c. level should change from -4V (no signal) to approximately 0 volts (strong signal). If no reading is obtained check the microswitch 1SA adjacent to the MHz tuning shaft. (Fig. 16 Fig. 18). The bottom tag of the microswitch should show the a.g.c. level in all operating modes; the centre tag in all settings of the MHz control except '00' and the top tag only in the '00' setting of the MHz tuning control.

NOTE: The levels quoted in para. 13 cannot be given exactly because the level of a strong signal is not defined.

DETAILED CHECK

14. (1) Connect a signal generator, 75 ohm source to the antenna socket and set to 3.6 MHz at 10 mV p.d. (20 mV e.m.f.)

(2) Disconnect the coaxial lead from the front end of the I.F. Module. Terminate the free lead in 100 ohms.

(3) Connect the electronic voltmeter across the 100 ohm termination.

(4) Set R.F. RANGE to WB
AE ATT to MIN
System Switch to MAN
R.F. GAIN fully clockwise.

(5) Carefully tune the MHz and kHz tuning controls to 03.500 At the resonant point the electronic voltmeter reading should rise to 100 mV approx. If no reading, or very low reading is obtained proceed as described in next paragraph.

Fault Prior to I. F. Unit

15. (1) Refer to para. 12 and check that 1 MHz oscillator is functioning. If no whistles are heard check the 1 MHz module as described in Chapter 4 para. 18.

(2) Move the 2nd V. F. O. switch between the INT and EXT positions and listen for a change of noise level. If noise level does not change, the 3rd Mixer may be faulty. Make sure that the 2nd V. F. O. switch is returned to the INT position. Refer to Chapter 4 for further tests.

(3) If the 3rd Mixer check is satisfactory, but a fine adjustment of the MHz tuning control fails to produce any rise in noise level, proceed as follows:

(4) On the 2nd Mixer connect an electronic voltmeter to test point TP2. Rotate the MHz tuning control slowly, and note the voltmeter reading as a frequency is selected. The reading should rise to approximately 80 mV at each resonant point.

(5) If approximately 80 mV is not obtained in (4) check the 1st V. F. O. outputs. Disconnect the free coaxial leads from their respective bulkhead sockets on the (underside of the main chassis. (Fig. 18). Terminate the lead which feeds the 1st Mixer in 47Ω and check for approx. 100 mV with the electronic voltmeter. Terminate the lead which feeds the 37.5 MHz Generator in 27Ω, and check for approx. 100 mV with the electronic voltmeter.

(6) If the 1st V. F. O. outputs are satisfactory the 37.5 MHz Generator module must be checked in accordance with Chapter 4 paragraph 19.

(7) If the 37.5 MHz checks are satisfactory check the R. F. Module as follows:

(8) Disconnect the r.f. output lead from the side of the module (SKT2) and connect an electronic Voltmeter to the socket.

(9) Connect a signal generator (75Ω source) to the R.F. INPUT (antenna) socket. Set the signal generator to the levels indicated in Table 2, according to whether the receiver is in the R.F. TUNE or the WB mode, and check the electronic voltmeter readings. The System switch should be at MAN, AE ATT to MIN and RF GAIN to maximum.

TABLE 2

	Output from R.F. Module	
Signal Generator Level (e.m.f.)	In Tuned Mode	In WB Mode
3 mV	18 mV	-
10 mV	-	10 mV

(10) A low output from the R.F. Module may indicate an a.g.c. fault. With the System switch to MAN, and the R.F. GAIN to maximum, the d.c. reading on the a.g.c. line should be -4 volts. A suitable measuring point is at the rear panel terminal A.G.C. R.F., or if the cover is removed at the centre contact of the microswitch 1SA (Fig.18). If this a.g.c. level is not obtained a fault in the i.f. unit is probable. If the -4V level is satisfactory the r.f. amplifier gain may be tested with the a.g.c. removed, as follows:-

(11) On the r.f. amplifier board connect two 0.1 μF capacitors between the -16V line and the junction of diodes 3D1 and 3D2, and 3D3 and 3D4, respectively, thereby removing the gain control from 3VT2 and 3VT3. Note the resulting increase in output. If the increase in gain is significantly greater than 4 dB the a.g.c. circuit should be investigated. The forward resistance of the diodes 3D1 to 3D4 should be checked. When measured on the 'ohms + 100' range of the AVO 8 test meter the forward resistance of any one of the diodes should not exceed 25Ω.

Fault in the I.F. Unit

16. A systematic check on the I.F. Unit is described in Chapter 4.

CHAPTER 6

ROUTINE MAINTENANCE

GENERAL

1. The RA. 1217 receiver should require no mechanical maintenance until a considerable period of service has elapsed, provided that the receiver has been treated with reasonable care. It is important that modules should be carefully but firmly replaced following removal and that all covers should be clean and secure, to maintain the high standard of screening which is necessary. Make sure that no cover-screws have suffered stripped threads due to overtightening. Whenever a module has been removed ensure that on replacement it is clean and free from grease or corrosion to ensure good electrical bonding. Ensure that retaining screws are made tight.

LUBRICATION

2. No lubrication is needed for at least the first year of service. Fast moving shafts are carried in sealed races which require no lubrication. Certain slow moving surfaces are carried in 'oilite' bearings which after appreciable service may each be given a single drop of thin molybdenised oil at intervals of approximately six months. A drop or two of oil may be given to the stop-collars of the MHz and KHz tuning system. Remove any surplus lubricant to prevent the accumulation of dirt.

CHAPTER 7

DISMANTLING AND RE-ASSEMBLY

WARNING: BEFORE DISMANTLING ANY PART OF THE RECEIVER DISCONNECT THE MAIN POWER SUPPLY AT ITS SOURCE.

INTRODUCTION

1. This chapter describes how to remove the modular units of the receiver. Detailed re-assembly instructions are not given in those cases where it is feasible to interpret the dismantling procedures in the reverse order. Detailed instructions are given however, for re-assembly of the R. F. Unit, 1st V. F. O. and 2nd V. F. O. due to the requirement for accurate setting of variable controls in these modules. Reference to figure 18 will assist identification of the required module.

CAUTION: (1) When refitting a module which requires the mating of a fixed plug and socket. Take care that the plug and socket are correctly aligned before applying pressure to the module. Otherwise pin damage may result.

(2) It is important that all module retaining screws should be firmly tightened to ensure good electrical bonding throughout the receiver. Loose screws can cause spurious frequencies to develop. When tightening screws, do not apply such force that screw threads might become stripped.

RECEIVER TOP COVER

2. The top cover of the rack mounted receiver is retained by 15 screws. Note the securing screw near to the centre which locates in the 1 MHz unit. All the cover screws must be tight during normal operation to ensure satisfactory screening. This cover must be removed as a first step in any dismantling operation except for removal of the power unit.

UNDERSIDE SCREWS

3. Those screws on the underside of the receiver which secure the various modules are marked with a circle of paint.

RECEIVER BOTTOM COVER

4. A small cover on the underside of the receiver is held by 8 screws. This cover may be removed for access to the audio board, the H. T. Filter board and the connnectors of the 2nd and 3rd Mixer modules.

FRONT PANEL

5. The removal of the panel is normally of no benefit in servicing, but it is necessary if the B. F. O. assembly is to be removed.

6. Tools: Hexagonal keys
Screwdriver
Spanner.

Front Panel Removal

7. (1) Using a suitable hexagonal key slacken the grub-screws and remove all control knobs.

(2) The panel is held by four chromium plated screws. Remove these nuts and screws.

(3) Remove the two chromium screws in the centre of the panel adjacent to the meter.

(4) The panel can now be withdrawn.

POWER UNIT

8. Removal

(1) Release the four captive retaining screws from the unit on the rear panel and ease the unit gently towards the rear.

9. Re-assembly

(1) Insert the unit squarely and apply gentle pressure, evenly, to ensure correct mating of the plug and socket, and replace the four retaining screws.

I. F. MODULE

10. Tools: Medium and large screw drivers:
Spanner .25 inch A. F.

11. Removal

(1) Remove the chassis side plate (6 screws).

(2) Using the spanner; undo the external coaxial connector from the socket at the forward end of the module.

(3) Remove two screws from the underside.

(4) Remove two screws from the right-hand side (viewed from the rear) of the rear connector panel.

(5) Withdraw the module towards the rear, releasing the 37-way connector at the front end while doing so.

R. F. MODULE

12. Tools: Hexagonal Key
Screwdrivers
Spanner .25 inch A. F.

13. Removal

(1) Remove the chassis side plate (6 screws)

(2) At the rear of the front panel release the grub screws in the boss of the R. F. Range calibrated scale.

(3) Slacken the grub screws in the control knob and remove.

(4) Within the receiver behind the front panel, on the side, remove the two screws which hold the shaft bearing bracket.

(5) Slacken the grub screws in the control shaft flexible coupler. Pull the control shaft forward a short distance out of the coupler.

(6) Release the five retaining screws on the underside of the chassis.

(7) Remove the coaxial connector from the side of the module adjacent to the 1st Mixer.

(8) Release the connector plug from the forward end. Earlier modules have soldered connections on the side; these must be unsoldered after noting the pins and colour coding of the wiring.

(9) Draw the module forward a short distance and then lift upwards.

R. F. Module Refitting

14. (1) Remove the cover from the R. F. Module.

(2) Place the module approximately into its position in the chassis and solder the connections to the pins on the side. (In latter versions of the module these soldered connections are not fitted, connections are made by a plug and socket at the front end).

(3) Connect the coaxial lead from the 1st Mixer to the socket on the side of the R. F. Module.

(4) Place the module in position and screw-up the five retaining screws on the receiver underside.

(5) Insert the connector plug at the forward end (only on later versions of the module).

(6) Turn the Range switch shaft by hand to its fully anti-clockwise setting (viewed from the front).

(7) Insert the control shaft into the coupler. (Ensure that the R. F. Range calibrated scale is mounted on the shaft).

(8) Tighten the grub screws in the shaft coupler.

(9) Set the R. F. Range scale so that 'WB' is displayed in the window and then tighten the grub screws in the boss of the Range scale.

(10) Put the R. F. Range control knob on to the shaft and tighten the grub screws. Rotate the control and check that the Range figures are correctly positioned in the window.

(11) In the R. F. Module set the variable capacitor so that one segment of vanes is clear (see illustration in Chapter 4).

(12) Put the knob on the control shaft so that the white spot is in line with the panel markings 1 to 16 and tighten the grub screws.

(13) Replace the module cover and chassis side plate.

37.5 MHz GENERATOR
1 MHz OSCILLATOR AND CALIBRATOR

15. These two units are contained in separate sections mounted in a single module. Following removal of the module the two units can be separated, if necessary, but this involves delicate work with a low-wattage soldering iron.

Tools: Screwdrivers.

16. Removal

(1) On the underside remove the cover plate and disconnect the 37.5 MHz Generator coaxial lead from the connector bracket (Fig. 18).

(2) Release the four screws on the underside of the receiver.

(3) Unplug the multi-way connector from the module.

(4) Lift out the module.

17. Sub-Unit Separation

(1) The upper deck is the 1 MHz and calibrator unit, the lower unit contains the harmonic generator, harmonic mixer and 37.5 MHz circuit.

(2) Remove the cover from the upper unit (three screws).

(3) Release the four captive screws in the base of the upper unit. The upper unit can now be hinged upwards.

(4) Remove the cover from the lower unit to obtain access for adjustment and servicing.

(5) To completely remove a unit it is first necessary to unsolder two wires from the lower unit, using a low-wattage soldering iron, as follows:

(6) Unsolder the violet-coloured wire from the base of the lower unit.

(7) The blue coaxial lead can be unsoldered from the underside of the small transverse board on the lower unit. Undo the screws holding the board and lift upwards to give access to the unsoldering point. Use the minimum heat necessary to free the joint.

1st MIXER and 40 MHz FILTER

18. Tools: Screwdriver
Spanner .25 inch AF

19. Removal

(1) Disconnect the coaxial lead from the side of the R. F. Module.

(2) On the receiver underside remove the cover plate and disconnect the 1st Mixer lead from the connector bracket.

(3) On the underside, adjacent to the H. T. Filter Board release the screw which is located in a tubular shroud. (The one further from the rear panel).

(4) On the upperside release one screw at each end of the 1st Mixer and 40 MHz unit.

(5) Pull the unit upwards taking care not to trap the free coaxial leads which are attached.

2nd MIXER

20. Tools: Screwdriver

21. Removal

(1) Remove the cover plate from the underside of the receiver.

(2) On the underside remove two of the four retaining screws. (from diagonally opposite corners).

(3) Slacken off the two remaining screws and push them upwards, thereby partly easing the module out of its connector. Then completely remove these screws.

(4) On the upperside grip the module and pull upwards. If sufficient grip cannot be obtained, remove the module cover and carefully pull on the pillars.

3rd MIXER

22. Follow the same procedure as for the 2nd Mixer in the previous paragraphs.

37.5 MHz BANDPASS FILTER

23. Tools: Screwdriver.

24. Removal

(1) On the receiver underside remove the cover plate and release the retaining screw which is located in a tubular shroud adjacent to the H.T. Filter board. (The screw nearer the rear of the receiver).

(2) On the upper chassis release the two end screws from the 37.5 MHz Filter Unit.

(3) Ease the unit upwards, keeping it level to avoid distortion of the fixed coaxial connectors.

1st V.F.O.

25. Tools: Screwdriver
Hexagonal key
Spanner .25 AF
Soldering iron (earlier receivers only)

NOTE: Instructions for refitting are given in paragraph 27.

26. Removal

(1) Disconnect the violet h.t. lead from the small terminal block adjacent to the 1st V.F.O. If this terminal block is not fitted refer to operation (2).

(2) On earlier receivers it is necessary to unsolder the violet h.t. lead from the H.T. Filter board on the underside of the receiver. (Remove the cover plate).

(3) Slacken the grub-screws in the coupler on the 1st v.f.o. tuning shaft.

(4) On the receiver underside remove the cover plate and disconnect the two 1st v.f.o. coaxial leads from the connector bracket.

(5) Hold the 1st v.f.o. firmly in position with one hand. With the other release the four retaining screws on the underside of the receiver.

(6) When the retaining screws are free the 1st v.f.o. can be drawn free of the shaft coupler and lifted out.

1st V.F.O. Refitting

NOTE: It is assumed that all other parts of the receiver are installed and are serviceable. A digital counter to read up to 70 MHz is required.

27. (1) Place the 1st v.f.o. module into its correct position on the chassis and slide the tuning shaft into the shaft coupler. Do not tighten the grub screws. Check that the coaxial leads are fed through to the underside of the receiver.

(2) Hold the 1st v.f.o. module with one hand and make it secure with the four retaining screws on the underside.

(3) Connect up the h.t. lead at terminal block TB2 (or resolder the violet lead if this was disconnected in operation (2).

(4) Attach a digital counter to one of the 1st v.f.o. coaxial output leads.

(5) Set the MHz control to 01'

(6) Connect power to the receiver and set the System switch to MAN.

(7) Move the 1st v.f.o. section of the tuning shaft by hand (not the MHz control) until the digital counter reads 41.5 MHz ±10 kHz.

(8) Check that the MHz control is at '01' and tighten the grub-screws in the shaft coupler. On completion the digital counter must read 41.5 MHz ±20 kHz.

(9) Refer to Chapter 3 paragraph 9 and perform the MHz calibration check.

(10) On completion connect both the 1st v.f.o. output coaxial leads to their correct sockets at the bracket on the underside of the receiver.

2nd V.F.O.

28. Tools: Spanner 10/32 U.N.F. Hex
Hexagonal key

NOTE: Instructions for refitting are given in paragraph 30.

29. Removal

(1) Using the hexagonal key slacken the grub screws in the shaft coupling.

(2) Detach the connector which carries the chassis wiring.

(3) Completely remove the three bolts which hold the module to the cast lugs of the chassis.

(4) Draw the module away so that the tuning shaft slips out of the shaft coupler.

2nd V. F. O. Refitting

NOTE: A digital frequency meter (counter) is required.

30. (1) Rotate the kHz tuning control fully anti-clockwise against its stop, then turn clockwise and set the readout to indicate '.000'. This ensures that the correct end of the scale is selected.

(2) Lock the kHz control at . 000.

(3) Set the CAL-FINE TUNE control to the mid-point of its rotation.

(4) Remove the cover from the 2nd V. F. O. module and set the capacitor vanes by hand to the minimum capacitance position (moving vanes fully out of mesh and straight edges parallel).

(5) Place the 2nd V. F. O. module into position on the chassis and enter the shaft into the flexible coupler on the control mechanism.

(6) Make the module secure by inserting the three retaining bolts and tightening up.

(7) Insert the connector plug into the module socket.

(8) Connect the digital counter to the rear socket '2nd V. F. O. OUT'. Check that the 2nd V. F. O. switch is at INT.

(9) Connect the power supply to the receiver and set the System switch to MAN.

(10) By hand make a fine adjustment of the capacitor shaft to obtain a reading on the digital counter of 4. 6 MHz plus or minus 50 Hz.

(11) Tighten one grub screw in the shaft coupler and ensure that the counter reading has not changed while tightening.

(12) Put the cover on the module and make tight the screws.

(13) Set the System switch to CAL.

(14) Refer to Chapter 3 paragraph 8 and perform the 2nd V. F. O. calibration check.

(15) If results are satisfactory tighten both grub screws in the shaft coupler and check that the module cover is firmly screwed down. If the calibration check is outside the limits of ±500 Hz refer to (16) below.

(16) The trimmer capacitor C2, which is accessible via a hole in the cover of the 2nd V. F. O. module (the upper of the two holes) may be adjusted to correct a calibration error of up to one kilohertz. Before making any adjustment of C2 ensure that the hand-setting of the capacitor vanes in operation (10) has been done as accurately as possible.

1st I. F. UNIT

31. This small unit is part of a large assembly which includes the i. f. bandwidth filters together with the Bandwidth switch and B. F. O. controls.

32. Tools: Screwdriver
Spanner .25 inch AF
Soldering iron

33. Removal of 1st I. F. Unit

(1) Remove the main I. F. Module (Refer to paragraph 11) and unplug the 2nd Mixer module.

(2) On the underside of the receiver remove the five screws which retain the bandpass filter assembly.

(3) On the upper side remove the two screws which secure the 1st I. F. Unit to the Bandpass filter assembly.

(4) Move the bandpass filter assembly sideways. This gives access for the unsoldering of the wires from the 1st I. F. Unit. Ensure that the coaxial leads to the 1000Ω and 100Ω output pins are identified for correct re-connection.

(5) Push the 1st I. F. Unit out of its mounting and lift out.

NOTE: The coaxial connection to the 3rd mixer (wire number 8) may have to be unsoldered if it restricts the movement of the filter assembly.

B. F. O. Assembly

34. The B. F. O. oscillator and amplifier boards are part of a larger assembly including the B. F. O. controls, Bandwidth switch, i. f. bandpass filters and 1st I. F. Unit. The removal of this entire assembly

involves the unsoldering of a complex cable harness and should not normally be necessary. To remove the B. F. O. boards proceed as follows.

35. Tools: Screwdriver
Soldering iron
Spanner .25 inch AF

36. Removal of B. F. O. Boards

(1) Remove the main I. F. Module (Refer to paragraph 11).

(2) On the underside of the receiver remove the five screws which retain the bandpass filter assembly.

(3) Move the filter assembly sideways and unsolder all connections from the 1st I. F. Unit and the crystal filters.

(4) Lift out the bandpass filter assembly.

(5) The B. F. O. boards are now accessible. Unsolder the connections from the board to be removed. Remove the four retaining screws and lift out the board.

METER CONTROL BOARD

37. Tools: Screwdriver
Spanner 4BA
Soldering iron.

Removal

(1) Remove the side plate from the receiver (Six screws)

(2) Remove the four screws which secure the pillars of the control board to the side member of the receiver.

(3) Unsolder the connecting wires and lift out the board.

(4) When re-connecting identify the leads as follows. Also refer to Fig. 18.

R1	Wire 34) Twin		D1/D2	Red/Blue
D2/D4	Wire 34) screened		D3/D4	Blue/Orange
R2	Violet		R3	Blue/White

H. T. FILTER BOARD

38. Tools: Soldering iron
4BA Spanner
Screwdriver

39. Removal

(1) Remove the small cover from the underside of the receiver

(2) Unsolder the connecting wires from the H. T. Filter board.

(3) Remove the two nuts and lift up the board sufficiently to unsolder the remaining connections.

(4) Lift out the board.

AUDIO AMPLIFIER BOARD

40. Tools: Soldering iron
Screwdriver

Removal of One-Watt Audio Board

(1) Remove the small cover from the underside of the receiver.

(2) Unsolder the connecting leads from pins 2, 3, 4, 5, 6, 7, 8, 9, of the audio board.

(3) Remove the four retaining screws.

(4) Carefully ease the transistors VT4 and VT5 out of their holders at the same time as the board is lifted out.

(5) When re-assembling identify the connecting wires as follows:

Pin 2: To audio transformer (Red/Orange)
Pin2: To control board 3D2/3D4 (Blue)
Pin 3: To capacitor 1C15
Pin 3: To 3R1 control board (Red).
Pin 4: Sleeve 31
Pin 5: To capacitor 1C12 (Red/White)
Pin 6: Violet (Red sleeve) Violet (White sleeve)
Pin 7: Sleeve 32
Pin 8: Earth, (Black)
Pin 9: To capacitor 1C17.

41. ### 10 mW Audio Board Connections

Pin 1. Sleeved lead number 31 to slider of A.F. Gain potentiometer.

Pin 2 { Orange/grey wire to 1SKT 11 pin A.
{ Blue wire of sleeve number 34 to meter diodes 3D2/3D4 (Fig.16).

Pin 3 { Orange/brown lead to 1SKT 11 pin B.
{ Red lead of sleeve number 34 to resistor 3R1 (Fig.16).

Pin 4 To screen of lead number 33.

Pin 5 { Wire of lead number 33 to Phones jack JK1.
{ Wire of screened lead (or orange/white on some receivers) to 1SKT 11 pin D.

Pin 6 Violet (two leads) - 16V.

Pin 7 Wire of lead number 32 to slider of A.F. Level potentiometer.

Pin 8 Earthing wire to chassis tag.

42. B. F. O. and Bandwidth Assembly

The following items are mounted on an assembly which can be removed as a single unit, but such removal should not normally be attempted due to the numerous connections which have to be unsoldered.

(a) B. F. O. oscillator and amplifier boards.
(b) lst I. F. Amplifier unit.
(c) DET - B. F. O. Mode Switch.
(d) Bandwidth (I. F. BW) switch.
(e) R. F. Gain potentiometer.
(f) A. F. Gain potentiometer.
(g) Crystal bandwidth filters.

Tools: Screwdrivers
Soldering Iron

Assembly Removal

(1) Remove all the control knobs from the front panel.

(2) Remove the four chromium screws from the front panel and remove the panel.

(3) Remove the main I. F. Module.

(4) On the underside of the receiver remove the five screws which secure the B. F. O. and Bandwidth Assembly.

(5) At the front, above the B. F. O. controls, remove two screws. The assembly is now free to move, subject to the wiring connections which must be unsoldered.

CHAPTER 8

LIST OF COMPONENTS

CONTENTS

NOTE: Component values are quoted as follows:

Resistors		Capacitors	
No suffix	= ohms	No suffix	= microfarads
Suffix 'k'	= kilohms	Suffix 'p'	= picofarads
Suffix 'M'	= megohms		

ORDERS FOR SPARE PARTS

In order to expedite handling of spare part orders, please quote:-

(1) Type and serial number of equipment.

(2) Circuit reference, description, Racal part number, and manufacturer of part required.

(3) Quantity required.

NOTE: If the equipment is designed on a modular basis, please include the type and description of the module for which the replacement part is required.

NOTES ON COMPONENT CHANGES AND ADDITIONS

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer

REPLACEMENT MODULES AND ASSEMBLIES

NOTES. 1. Table 1, below, lists the "plug-in" modules which can be quickly fitted in the receiver and are therefore essential to a rapid service procedure. Table 2 on the next page lists the principal component board assemblies likely to be required in servicing the various modules.

2. When ordering a replacement module please state the module title and the part number. When ordering a circuit board or sub-assembly please state the module in which the part is fitted, as well as the name of the item and the part number, as listed in Table 2.

3. Always quote the receiver title (RA.1217A, RA.1217B etc) and the serial number.

TABLE 1

Module Assemblies

Name	Part Number
R.F. Unit (see NOTE 2 below)	CA.38538/A or B
1st Mixer and 40 MHz Filter	BA.28211/A
2nd Mixer	CA.30959/A
3rd Mixer	CA.35970/A
1st VFO	CA.28120/A
2nd VFO	CA.28101/A
37.5 MHz Generator with 1 MHz Oscillator Amp and Calibrator	CA.28276/B
37.5 MHz Band-Pass Filter Unit	BA.28192/A
I.F. Module (455 kHz output)	DA.38580/A
I.F. Module (100 kHz output)	DA.38580/B
Power Unit PU.1153	CA.38640/A

NOTE 1: Replacement printed circuit boards are listed in Table 2 on the following page. Note that two types of i.f. converter boards are available (100 kHz and 455 kHz) and two types of audio amplifier board (10mW and 1-watt). Ensure that the correct type is ordered as fitted to the receiver being serviced.

NOTE 2: R.F. Units
R.F. Unit type CA.38538/A has soldered connections via pins on the side of the unit. R.F Unit type CA.38538/B is fitted with a Cannon multi-way connector. Type CA.38538/A is fitted in earlier versions of the RA.1217.

TABLE 2

Sub-Circuit Assemblies

R.F. Unit	Part No.
0-30 MHz Filter	AA.28188/A
R.F. Range Coil & Switch Assy.	CA.38539/A
R.F. Amp Board	BA.28155/B
Attenuator Switch Assy.	AA.34081
2nd Mixer	
Mixer Board	BA.28177
1st VFO	
Oscillator Board	BA.35195
Amplifier Board	BA.32535
Amplifier Board	BA.28128
1 MHz Amp and Calibrator	
Complete Assembly	BA.28285/B
1 MHz Amplifiers	BA.32858
Calibrator Board	BA.41745
37.5 MHz Generator	
Complete Sub-Assembly	BA.28284/B
Harmonic Gen. Board	BA.32854
Harmonic Filter Assembly	BA.35836
Harmonic Mixer Board	BA.37894
37.5 MHz Amp. Board	BA.32850
BFO (600 kHz)	
Oscillator Board	BA.30540
Amplifier Board	BA.30542
I.F. Module	
I.F. Amp. Board	BA.30533
H.T. Supply Filter	AA.30535
Detector Board	BA.28236
A.G.C. Board	BA.31466/B

1st. Mixer	Part No.
Mixer Board	BA.28215
40 MHz Filter	AA.28197
3rd Mixer	
Mixer Board	BA.35966
2nd VFO	
Oscillator Board	BA.35808
Amplifier Board	BA.35807
Component Board	AA.39599/A
Power Unit Type PU.1153 (AC/DC)	
Component Board	BA.37549
Audio Amp. Board	
10 mW	BA.31462
or	
1 watt	BA.39442
Control Board	BA.38883
H.T. Filter Board	AA.28179/B
1st I.F. Amp. Unit	BA.28203
Circuit Board	BA.31474
Converter: 455 kHz	
Osc. Board (455 kHz)	BA.38568/A
Amp. Board (455 kHz)	BA.34783/A
Converter: 100 kHz	
Osc. Board (100 kHz)	BA.38568/B
Amp. Board (100 kHz)	BA.34783/B

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer

MAIN CHASSIS ITEMS

(Fig. 16)

NOTES 1: Components prefixed '1' are located in various parts of the chassis, but are not in any module.

2: Components prefixed '2' are located in the Bandwidth and BFO switch assembly.

3: Components prefixed '3' are located on the Meter Control Board.

4: Components prefixed '4' are located on the H.T. Filter board. (chassis underside)

	ohms	Resistors				
1R1		not used				
1R2		not used				
1R3		not used				
1R4	1.2k	Metal Oxide		5	906346	Electrosil TR5
1R5	680	Metal Oxide		5	910113	Electrosil TR4
1R6	560	Metal Oxide		5	907496	Electrosil TR5
1R7	100	Metal Oxide		5	908276	Electrosil TR4
1R8	100	Metal Oxide		5	907491	Electrosil TR5
1R9	330	Metal Oxide		5	908153	Electrosil TR5
2R1	390	Composition	0.1	10	902503	Erie 15
2R2		not used				
2R3		not used				
2R4	100	Metal Oxide		5	908276	Electrosil TR4
2R5		not used				
2R6		not used				
2R7	3.3k	Metal Oxide		5	900991	Electrosil TR4
3R1	3.9k	Metal Oxide		5	906029	Electrosil TR5
3R2	22k	Metal Oxide		5	906553	Electrosil TR5
3R3	5.6k	Metal Oxide		5	906032	Electrosil TR5
4R1	68	Metal Oxide		5	907494	Electrosil TR5
		Potentiometers				
1RV1		not used				
1RV2	1k	Dimmer: preset			ASW35811	
1RV3	500	Cal-Fine Tune: variable			BSW41601	
2RV1	10k	A.F. Level: preset			900615	Plessey MP
2RV2	1k	R.F. Gain) dual control			BSW38716	
2RV3	10k	A.F. Gain)			BSW38716	
3RV4	47k	'S' Meter Setting: Linear: preset			908635	Plessey MP
4RV1	2.2k	AGC Set: Linear			909836	Plessey MP
		Capacitors	volts			
1C1	.001	Ceramic	350	20	902122	Lemco 310K

NOTE: 1R8 used only on 1W version.

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		MAIN CHASSIS ITEMS (continued)				
		(Fig. 16)				
		Capacitors (contd)	volts			
1C2	4-20p	Variable B.F.O. Tune			AD38584	
1C3	0.1	Polyester	250	20	909428	Mullard C280AE/P100K
1C4	0.22	Ceramic	50	-20+50	908338	T.C.C. CML10
1C5	0.1	Polyester	250	10	909847	Mullard C280AE/A100K
1C6		not used				
1C7		not used				
1C8	0.1	Polyester	250	20	909428	Mullard C280AE/P100K
1C9	0.1	Polyester	250	20	909428	Mullard C280AE/P100K
1C10	0.1	Polyester	250	20	909428	Mullard C280AE/P100K
1C11	0.1	Polyester	250	20	909428	Mullard C280AE/P100K
1C12	500	Electrolytic	25	-20+50	900748	Hunts MEF37T
1C13	10	Electrolytic	20	20	905399	S.T.C. 472/LWA/401GA
1C14	.0022	Ceramic	350	20	902126	Lemco 310K
1C15	.033	Polyester	150	5	908114	Wima Tropyfol M.
1C16	0.1	Polyester	250	20	909428	Mullard C280AE/P100K
1C17	500	Electrolytic	25	-20+50	900748	Hunts MEF37T
1C22	0.1	Polyester	250	20	909428	Mullard C280 AE/P100K
NOTE:	1C12, 1C15 and 1C17 are used only with the 1 watt amplifier - refer to Fig.14b.					
2C1	0.1	Polyester	250	10	909847	Mullard C280AE/A100K
2C2	Refer to 1C2 in B.F.O. Assembly. Page 8 - 29.					
2C3	1	Electrolytic	40	-10+100	910952	Mullard C426 AS/G1
4C1	0.1	Polyester	250	10	909847	Mullard C280AE/A100K
4C2		not used				
4C3	50	Electrolytic	25	-10+50	908798	Mullard C426AR/F50
		Transformers				
1T1		Audio output transformer			CT39257	
		Switches				
1SA		Microswitch a.g.c.			911132	Unimax DPST Type USMF
1SB		Microswitch h.t.			911132	Unimax DPST Type USMF
1SC/1		)Power switching: part			BSW38691	
1SC/2		)of System switch 1SE				
1SD		2nd V.F.O. INT/EXT: break before make			ASW38678	
1SE		System switch			BSW38691	
1SF		Meter switch: break before make			912063	E.M.I. S5
2SA		Bandwidth switch			BSW38719	
2SB		DET-B.F.O. Mode			BSW38585	

NOTE: 1T1 used only on 1W version.

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer

MAIN CHASSIS ITEMS (continued)

(Fig. 16)

Connectors

Plugs (Free)

1PL1		Antenna plug: 75 ohms coaxial	905034	Transradio BN 1/7
1PL2		Chassis wiring to Power module: 15 way	908598	Cannon DAM15P
1PL3		I.F. module input: coaxial: elbow	908370	Belling Lee L1403/RFP/Ag
Plug free: 12-way			906612	Plessey Mk4 2CZ83302/5
Accessory Set for 12-way plug				Plessey 508/1/03013/205

Sockets

1SKT1		I.F. connector: free: 37-way	908603	Cannon DCM37S
1SKT2		Double ended bulkhead adaptor	908405	Belling Lee L1403/BS/Ag
1SKT3		Double ended bulkhead adaptor	908405	Belling Lee L1403/BS/Ag
1SKT4		1st Mixer: insert	908600	Cannon DM53743-5001
1SKT5		HT to 1st Mixer	908604	Sealectro 5BC
1SKT6		37.5 MHz Filter: insert	908600	Cannon DM53743-5001
1SKT7		2nd Mixer connector - multiway	911160	Cannon DBMF9W4S
1SKT8		3rd Mixer connector - multiway	911160	Cannon DBMF9W4S
1SKT9		37.5 MHz Gen. connector-multiway	908602	Cannon DBM9W4S
1SKT10		2nd VFO connector-multiway	908599	Cannon DBM13W3S
	NOTE:	The coaxial inserts in the Cannon connectors SKT7, SKT8, SKT9 and SKT10 can be renewed separately, using coaxial insert DM53743-5001: Part No. 908600.		
1SKT11		12-way outlet: fixed.	906607	Plessey Mk4 CZ63979/5
	NOTE:	The free coaxial plugs for connection to the rear panel sockets 1SKT12 to 1SKT17 are BNC 75Ω Part number 905034		
1SKT12		2nd VFO IN: fixed, 75Ω Coaxial	907457	Transradio BN 12/7
1SKT13		2nd VFO OUT: fixed, 75Ω Coaxial	907457	Transradio BN 12/7
1SKT14		L.F. fixed, 75Ω Coaxial	907457	Transradio BN 12/7
1SKT15		PAN fixed, 75Ω Coaxial	907457	Transradio BN 12/7
1SKT16		1 MHz IN fixed, 75Ω Coaxial	907457	Transradio BN 12/7
1SKT17		1 MHz OUT: fixed, 75Ω Coaxial	907457	Transradio BN 12/7
1SKT18		Connector 5-way, free (not fitted to earlier receivers)	911785	Cannon DEM5W1S
Coaxial insert to SKT18			907076	Cannon 53742-5001
JK1		Phone jack socket	901509	Igranic P71
Phones jack plug (free) to fit JK1			901557	Igranic P50

Terminal Blocks

TB1	6-way. Refer to I.F. Module details		
TB2	1st V.F.O. h.t. connection	AD398351	(not fitted on early receivers)
TB3	(in fine tune circuit)	905221	Wingrove & Rogers TS8-04

Meter

M1	'S' Meter	BD35519	

Dial Lamps

1LP1-1LP3		908605	Vitality 14v690
Lampholders for ILP1-ILP3			Bulgin Type LVS64

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		MAIN CHASSIS ITEMS (continued)				
		Diodes				
1D5 to 1D6					905395	Mullard OAZ 243
3D1 to 3D4:		Meter rectifiers			900071	Mullard OA91
		Crystal Bandpass Filters				
	13 kHz	BD38733/A	995467	3 kHz	BD38733/C	995049
	8 kHz	BD38733/B	995028	1.2 kHz	BD38733/D	995029
	6.5 kHz	BD38733/H	996029	500 Hz	BD38733/F	995503
	6.0 kHz	BD38733/G	995943	200 Hz	BD38733/E	995030
		10 mW AUDIO AMPLIFIER (BC.31462) - Fig. 14a				
	ohms	**Resistors**				
R1	5.6k	Metal Oxide		5	908273	Electrosil TR4
R2	2.2k	Metal Oxide		5	908270	Electrosil TR4
R3	5.6k	Metal Oxide		5	908273	Electrosil TR4
R4	330	Metal Oxide		5	908268	Electrosil TR4
R5	2.2k	Metal Oxide		5	908270	Electrosil TR4
R6	15k	Metal Oxide		5	908280	Electrosil TR4
R7	5.6k	Metal Oxide		5	908273	Electrosil TR4
R8	22k	Metal Oxide		5	908269	Electrosil TR4
R9	150k	Metal Oxide		5	908277	Electrosil TR4
R10	150k	Metal Oxide		5	908277	Electrosil TR4
R11	470	Metal Oxide		5	900992	Electrosil TR4
R12	470	Metal Oxide		5	900992	Electrosil TR4
R13	1k	Metal Oxide		5	908267	Electrosil TR4
R14	150k	Metal Oxide		5	908277	Electrosil TR4
R15	10k	Metal Oxide		5	900986	Electrosil TR4
R16	68k	Metal Oxide		5	908279	Electrosil TR4
R17	2.2k	Metal Oxide		5	908270	Electrosil TR4
R18	68	Metal Oxide		5	908278	Electrosil TR4
		Capacitors				
C1	80	Electrolytic	16	-10+50	908810	Mullard C426 AR/E80
C2	.022	Polyester	250	20	900982	Mullard C280 AE/P22K
C3	2.5	Electrolytic	16	-10+50	908808	Mullard C426 AS/E2.5
C4	80	Electrolytic	16	-10+50	908810	Mullard C426 AR/E80
C5	2.2	Tantalum	20	20	908316	U.Carbide K2R2J20S
C6	80	Electrolytic	80	-10+50	908810	Mullard C426 AR/E80
C7	80	Electrolytic	80	-10+50	908810	Mullard C426 AR/E80
C8	.001	Ceramic	350	20	902122	Lemco 310K
C9	80	Electrolytic	16	-10+50	908810	Mullard C426 AR/E80
C10	10	Electrolytic	16	-10+50	900068	Mullard C426 AR/E10
C11	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C12	50	Electrolytic	25	-10+50	908798	Mullard C426 AR/F50
		Transformers				
T1		Transformer assembly			CT 31476/A	
T2		Transformer assembly			CT 31478/A	
T3		Transformer assembly			CT 31477/A	
		Transistors				
VT1		p-n-p			911928	Mullard BCY 71
VT2,VT3, VT4		n-p-n			909017	Texas 2N929

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		ONE WATT-AUDIO AMPLIFIER BOARD (BC.39442) - Fig.14b				
	ohms	**Resistors**	watts			
R1	4.7k	Composition	0.1	10	902516	Erie 15
R2	1.5k	Composition	0.1	10	902510	Erie 15
R3	12k	Composition	0.1	10	902521	Erie 15
R4	1k	Composition	0.1	10	902508	Erie 15
R5	390	Composition	0.1	10	902503	Erie 15
R6	1k	Composition	0.1	10	902508	Erie 15
R7	1	Wirewound	1.5	10	911767	Welwyn W21
R8	1	Wirewound	1.5	10	911767	Welwyn W21
R9	15	Composition	0.1	10	902486	Erie 15
R10	33k	Composition	0.1	10	902526	Erie 15
R11	3.9k	Composition	0.1	10	902515	Erie 15
R12	120	Composition	0.1	10	902497	Erie 15
R13	3.3k	Composition	0.1	10	902514	Erie 15
R14	22k	Composition	0.1	10	902524	Erie 15
R15	100	Composition	0.1	10	902496	Erie 15
R16	390	Composition	0.1	10	902503	Erie 15
R17	1k	Composition	0.1	10	902508	Erie 15
R18	470	Composition	0.1	10	902504	Erie 15
R19	10	Composition	1/4	10	902411	Erie 16
		Potentiometers				
RV1	200k				914155	Beckman Helitrim 62P200K
RV2	2k				914154	Beckman Helitrim 62P2K
		Capacitors	volts			
C1	32	Electrolytic	10	-10+50	911764	Mullard C426AR/D32
C2	1	Electrolytic	40	-10+100	910952	Mullard C426AS/G1
C3	10p	Polystyrene	125	1pF	906840	Salford PF
C4	80	Electrolytic	16	-10+50	908810	Mullard C426AR/E80
C5	0.1	Polyester	250	20	909428	Mullard C280AE/P100K
C6	1	Tantalum	25	20	912994	S.T.C. TAG 1.0/25
C7	470p	Polystyrene	125	5	905362	Salford PF
C8	10	Tantalum	15	20	911763	S.T.C. TAG10/15
		Transistors				
VT1		n-p-n			911929	Mullard BC107
VT2		n-p-n			911929	Mullard BC107
VT3		p-n-p			911928	Mullard BCY71
VT4		n-p-n			908753	Mullard BFY51
VT5		n-p-n			908753	Mullard BFY51
VT6, VT7, VT8		n-p-n			909927	Texas 2N3711
		Diodes				
D1 and D2		Semi-conductor			906001	Texas 1S130

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		R. F. MODULE - Fig. 4				
		Resistors				
Coil Board and Capacitor Assembly						
	ohms		watts	%		
2R1	1 kΩ	Metal Oxide		5	908267	Electrosil TR4
2R2	100	Metal Oxide		5	908276	Electrosil TR4
2R3	100	Metal Oxide		5	908276	Electrosil TR4
Ae. Attenuator Switch Assembly						
R1	56	Carbon Hi. Stab.		5	906559	Erie N6
R2	15	Carbon Hi. Stab.		5	908300	Erie N6
R3	56	Carbon Hi. Stab.		5	906559	Erie N6
R4	33	Carbon Hi. Stab.		5	908301	Erie N6
R5	47	Carbon Hi. Stab.		5	905320	Erie N6
R6	33	Carbon Hi. Stab.		5	908301	Erie N6
R7	15	Carbon Hi. Stab.		5	908300	Erie N6
R8	56	Carbon Hi. Stab.		5	906559	Erie N6
R9	56	Carbon Hi. Stab.		5	906559	Erie N6
R.F. Amplifier Board (BC.28155)						
3R1	8.2k	Metal Oxide		5	908275	Electrosil TR4
3R2	820	Metal Oxide		5	908282	Electrosil TR4
3R3	560	Metal Oxide		5	909841	Electrosil TR4
3R4	1.5k	Metal Oxide		5	908296	Electrosil TR4
3R5	18k	Metal Oxide		5	908272	Electrosil TR4
3R6	18k	Metal Oxide		5	908272	Electrosil TR4
3R7	10k	Metal Oxide		5	900986	Electrosil TR4
3R8	390	Metal Oxide		5	908472	Electrosil TR4
3R9	3.3k	Metal Oxide		5	900991	Electrosil TR4
3R10	33	Metal Oxide		5	908690	Electrosil TR4
3R11		not used				
3R12		not used				
3R13		not used				
3R14	18k	Metal Oxide		5	908272	Electrosil TR4
3R15	10k	Metal Oxide		5	900986	Electrosil TR4
3R16	390	Metal Oxide		5	908472	Electrosil TR4
3R17	3.3k	Metal Oxide		5	900991	Electrosil TR4
3R18	33	Metal Oxide		5	908690	Electrosil TR4
3R19	22	Metal Oxide		5	911495	Electrosil TR4
		Thermistor				
3TH1					909839	Mullard VA1038

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer

R.F. MODULE (continued)

Capacitors

Module			volts			
C1		not used				
C2	0.1	Polyester	250	10	909847	Mullard C280AE/A100K
0 - 30 MHz Filter (AC.28188/A)						
1C1	68p	Polystyrene	30	2½	908321	Suflex HS7/A
1C2	82p	Polystyrene	30	2½	908322	Suflex HS7/A
1C3	18p	Polystyrene	30	1p	907171	Suflex HS7/A
1C4	82p	Polystyrene	30	2½	908322	Suflex HS7/A
1C5	68p	Polystyrene	30	2½	908321	Suflex HS7/A
Coil and Capacitor Assembly						
2C1	6p	trimmer: tubular			901987	Mullard C004EA/6E
2C2	6p	trimmer: tubular			901987	Mullard C004AE/6E
2C3	6p	trimmer: tubular			901987	Mullard C004AE/6E
2C4	6p	trimmer: tubular			901987	Mullard C004AE/6E
2C5	6p	trimmer: tubular			901987	Mullard C004AE/6E
2C6a	(Variable: R.F. TUNE. Minimum 8.5 pF)				BD38556	Wingrove & Rogers C78-22/57
2C6b	(range 157 pF each section)				BD38556	
2C7	not used					
2C8	4.7p	Ceramic	750	½p	902007	Lemco 310P100
2C9	680p	Silver Mica	300	2	902254	J & M C12S
2C10	680p	Silver Mica	300	2	902254	J & M C12S
2C11	6.8p	Ceramic	750	½p	902009	Lemco 310P 100
R.F. Amplifier Board (BC.28155)						
3C1	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
3C2	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
3C3	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
3C4	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
3C5	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
3C6	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
3C7	68p	Polystyrene	30	2½	908321	Suflex HS7/A
3C8	100p	Polystyrene	30	2½	908241	Suflex HS7/A
3C9	27p	Polystyrene	30	±1p	907172	Suflex HS7/A
3C10	220p	Polystyrene	30	2½	908320	Suflex HS7/A
3C11	33p	Polystyrene	30	±1p	906497	Suflex HS7/A
3C12	150p	Polystyrene	30	2½	908331	Suflex HS7/A
3C13	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
3C14	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
3C15	100p	Polystyrene	30	2½	908241	Suflex HS7/A

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		R.F. MODULE (continued)				
3C16	18p	Polystyrene	30	±1p	907171	Suflex HS7/A
3C17	220p	Polystyrene	30	2½	908320	Suflex HS7/A
3C18	33p	Polystyrene	30	±1p	906497	Suflex HS7/A
3C19	82p	Polystyrene	30	2½	908322	Suflex HS7/A
3C20	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
3C21	68p	Polystyrene	30	2½	908321	Suflex HS7/A
		Inductors and Transformers				
0 - 30 MHz Filter						
1L1		Aerial Filter Coil			CT.32963/A	
1L2		Aerial Filter Coil			CT.32964/A	
1L3		Aerial filter Coil			CT.32963/A	
Coil and Switch Assembly						
2L1		Coil Assembly			CT.32934/B	
2L2		Coil Assembly			CT.32933/B	
2L3		Coil Assembly			CT.32932/B	
2L4		Coil Assembly			CT.32931/B	
2L5		Coil Assembly			CT.32930/B	
R.F. Amplifier Board						
3L1		Coil Assembly: L.P. Filter			CT.28154/A	
3L2		Coil Assembly: L.P. Filter			CT.28152/A	
3L3		Coil Assembly: L.P. Filter			CT.28154/A	
3L4		Coil Assembly: L.P. Filter			CT.28152/A	
3T1		Transformer Assembly			CT.28149/A	
3T2		Transformer Assembly			CT.28149/A	
		Switches				
2SA		R.F. RANGE Switch			BSW38550	
SB		AE ATT (R.F. Attenuator Switch)			BSW28141	
Switch SB Assembly, complete					AA 34081	
		Transistors				
R.F. Amplifier Board						
3VT1					900618	Texas 2S303
3VT2					909111	RCA 2N3478
3VT3					909111	RCA 2N3478
		Diodes				
R.F. Amplifier Board						
3D1 to 3D4		Semi-conductor diodes			914144	Emihus HD 1812
3D5 and 3D6		Semi-conductor diodes			908343	Texas 1S920

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		R.F. MODULE (continued)				
3D11 and 3D12		Semi-conductor diodes			909837	Hughes HS 9003
NOTE: Earlier versions had diodes 3D7 to 3D10 in parallel with 3D1 to 3D4, and the diodes were then Part No.911796 Hughes HPS 1672/B.						
		Plugs and Sockets				
R.F. INPUT		Antenna: socket 75Ω fixed				Transradio BN12/7
PL1		Connector fixed, 5-way				Cannon DEM5W1P
Coaxial insert to PL1						Cannon DM53740-5001
		Fuse				
1FS1		500 mA Aerial protection			906850	Belling Lee L562
Fuseholder for 1FS1					908352	Belling Lee L1383
		Miscellaneous Items				
X1		Ferrite Bead			907488	Mullard FX1242
3X1		Ferrite Bead on 3VT3			907488	Mullard FX 1242
Voltage Surge Arrester (Spark Gap)						Siemens America Inc. Type B1-A230
Relay, Muting 340Ω 17.6V					911478	C.P. Clare Type F F.L. 7631

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		FIRST MIXER AND 40 MHz FILTER				
		(BC.28211) - Fig.8.				
		Resistors				
1st. Mixer Board (BC.28215)						
	ohms					
R1	56	Metal Oxide		5	908289	Electrosil TR4
R2	15k	Metal Oxide		5	908280	Electrosil TR4
R3	12k	Metal Oxide		5	908274	Electrosil TR4
R4	2.7k	Metal Oxide		5	908294	Electrosil TR4
R5	2.7k	Metal Oxide		5	908294	Electrosil TR4
40 MHz Filter (AC.28197)						
R1	1k	Metal Oxide		5	908267	Electrosil TR4
		Potentiometers				
1st. Mixer Board						
RV1	2.2k				909838	Ancillary Dev. Type T.0.5.
		Capacitors				
1st. Mixer Board (BC.28215)						
C1	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
C2	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
C3	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
C4	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
C5	39p	Polystyrene	30	1p	905374	Suflex HS7/A
C6	39p	Polystyrene	30	1p	905374	Suflex HS7/A
40 MHz Filter (AC.28197)						
C1	47p	Polystyrene	30	2½	908318	Suflex HS7/A
C2	47p	Polystyrene	30	2½	908318	Suflex HS7/A
C3	47p	Polystyrene	30	2½	908318	Suflex HS7/A
C4	47p	Polystyrene	30	2½	908318	Suflex HS7/A
C5	47p	Polystyrene	30	2½	908318	Suflex HS7/A
C6	47p	Polystyrene	30	2½	908318	Suflex HS7/A
C7	56p	Polystyrene	30	2½	908319	Suflex HS7/A
C8	470p	Polystyrene	30	2½	908317	Suflex HS7/A
		Inductors				
1st. Mixer Board						
T1		Transformer			CT 28212/A	

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		FIRST MIXER AND 40 MHz FILTER (continued)				
40 MHz Filter						
L1		Coil Assembly			CT 31031/A	
L2		Coil Assembly			CT 31030/A	
L3		Coil Assembly			CT 31030/A	
L4		Coil Assembly			CT 31030/A	
L5		Coil Assembly			CT 31030/A	
L6		Coil Assembly			CT 31030/A	
L7		Coil Assembly			CT 31030/A	
L8		Coil Assembly			CT 31030/A	
		Transistors				
VT1					906517	Texas 2N918
VT2					906517	Texas 2N918
		Plugs and Sockets				
PL1		From R.F. Unit			906391	Belling Lee L1403/FP/Ag.
PL2		-16V supply			908340	Sealectro FT-M-4
PL3		Connects to bulkhead adaptor SKT2			908370	Belling Lee L1403 RFP/Ag.
PL4		To 2nd. mixer			908341	Cannon insert DM 53740-5001

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
			SECOND MIXER			
			(BC.30959) - Fig.9			
		Resistors				
Module Chassis						
	ohms					
1R1	270	Metal Oxide			908284	Electrosil TR4
1R2 + 1R3		not used				
1R4	180	Metal Oxide		5	909125	Electrosil TR4
Circuit Board		(BC.28177)				
R1	47k	Metal Oxide		5	908391	Electrosil TR4
R2	4.7k	Metal Oxide		5	900989	Electrosil TR4
R3	12k	Metal Oxide		5	908274	Electrosil TR4
R4	680	Metal Oxide		5	908390	Electrosil TR4
R5	8.2k	Metal Oxide		5	908275	Electrosil TR4
R6	2.2k	Metal Oxide		5	908270	Electrosil TR4
R7	3.3k	Metal Oxide		5	900991	Electrosil TR4
R8	10k	Metal Oxide		5	900986	Electrosil TR4
R9	3.9k	Metal Oxide		5	900990	Electrosil TR4
R10	470	Metal Oxide		5	900992	Electrosil TR4
R11		not used				
R12	56	Metal Oxide		5	908289	Electrosil TR4
		Capacitors	volts			
C1	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C2	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C3	68p	Polystyrene	30	2½	908321	Suflex HS7/A
C4	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C5	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C6	.01	Polyester	250	20	910485	Mullard C280 AE/P10K
C7	.01	Polyester	250	20	910485	Mullard C280 AE/P10K
C8	150p	Polystyrene	30	2½	908331	Suflex HS7/A
C9	.01	Polyester	250	20	910485	Mullard C280 AE/P10K
C10	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C11	47p	Polystyrene	30	2½	908318	Suflex HS7/A
C12	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C13	100p	Polystyrene	30	2½	908241	Suflex HS7/A
C14	300p	Polystyrene	30	2½	908335	Suflex HS7/A
C15	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C16	15p	Polystyrene	30	1p	908336	Suflex HS7/A
C17	56p	Polystyrene	30	2½	908319	Suflex HS7/A
C18	150p	Polystyrene	30	2½	908331	Suflex HS7/A
C19	15p	Ceramic	750	5	902047	Lemco 310NP0

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		SECOND MIXER (continued)				
		Transformers and Inductors				
T1		37.5 MHz coupling			CT 28317/A	
T2		2-3 MHz output			CT 28316/A	
L1		Mixer load			CT 28310/A	
L2		Filter coil assembly			CT 28311/A	
L3		Filter coil assembly			CT 28312/A	
L4		Filter coil assembly			CT 28313/A	
L5		Filter coil assembly			CT 28314/A	
L6		Filter coil assembly			CT 28315/A	
		Transistors				
VT1					909414	Mullard 2N3323
VT2					909414	Mullard 2N3323
VT3					910866	Texas GM290A
		Plugs and Sockets				
PL1		9-way			908388	Cannon DBM9W4P
		Coaxial inserts A 1 to A 4			908341	Cannon DM53740-5001
		Ferrite Bead				
1X1		Ferrite Bead Assembly			AA40269	
1X2		Ferrite Bead			907488	Mullard FX1242

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
			THIRD MIXER			
			(BC.35970) - Fig.11			
		Resistors				
Module Chassis						
	ohms		watts	%		
1R1	39	Composition		10	902491	Erie 15
Circuit Board		(BC.35966)				
R1	18k	Metal Oxide		5	908272	Electrosil TR4
R2	82k	Metal Oxide		5	908691	Electrosil TR4
R3	3.9k	Metal Oxide		5	900990	Electrosil TR4
R4	2.2k	Metal Oxide		5	908270	Electrosil TR4
R5	470	Metal Oxide		5	900992	Electrosil TR4
R6	33	Metal Oxide		5	908690	Electrosil TR4
R7	82	Metal Oxide		5	908290	Electrosil TR4
R8	680	Metal Oxide		5	908390	Electrosil TR4
R9	33	Metal Oxide		5	908690	Electrosil TR4
R10	5.6k	Metal Oxide		5	908273	Electrosil TR4
R11	18k	Metal Oxide		5	908272	Electrosil TR4
R12	1k	Metal Oxide		5	908267	Electrosil TR4
R13	22	Composition	0.1	10	902488	Erie 15
R14	1k	Metal Oxide		5	908267	Electrosil TR4
R15	330	Metal Oxide		5	908268	Electrosil TR4
R16	68	Metal Oxide		5	910487	Welwyn F25
		Capacitors				
Module Chassis						
			volts			
1C1	820p	Polystyrene	30	2½	908389	Suflex HS7/A
1C2	820p	Polystyrene	30	2½	908389	Suflex HS7/A
1C3	.0033	Silvered Mica	200	2	902204	JMC CX22S/200
1C4	50	Electrolytic	25	-10+50	908798	Mullard C426/AR/F50
1C5	0.1	Polyester	250	20	909428	Mullard C280 AE/P100K
1C6	470p	Polystyrene	30	5	908396	Suflex HS7/A
Circuit Board		(BC.35966)				
			volts			
C1	0.1	Polyester	250	20	909428	Mullard C280 AE/P100K
C2	0.1	Polyester	250	20	909428	Mullard C280 AE/P100K
C3	680p	Silver Mica	300	2	902254	J.M.C. C12S
C4	150p	Polystyrene	30	2	908331	Suflex HS7/A
C5	.015	Silver Mica	125	1	910928	S.T.C. 454-LWA-75

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		THIRD MIXER (continued)				
C6	680p	Silver Mica	300	2	902254	J.M.C. C12S
C7	39p	Polystyrene	30	1p	905374	Suflex HS7/A
C8	0.1	Polyester	250	20	909428	Mullard C280 AE/P100K
C9	0.1	Polyester	250	20	909428	Mullard C280 AE/P100K
C10	68p	Polystyrene	30	2½	908321	Suflex HS7/A
C11	150p	Polystyrene	30	2½	908331	Suflex HS7/A
C12	0.1	Polyester	250	20	909428	Mullard C280 AE/P100K
C13	0.1	Polyester	250	20	909428	Mullard C280 AE/P100K
		Transformers and Inductors				
Module Chassis						
1L1		Coil Assembly			CT 31026/A	
1L2		Coil Assembly			AA 38847/A	
Circuit Board						
T1		Transformer			CT 35968/A	
T2		Transformer			CT 35968/A	
T3		Transformer			CT 35968/A	
L1		Coil Assembly			CT 35969/A	
L2		Coil Assembly			CT 31023/A	
L3		Coil Assembly			CT 35971/A	
L4		Coil Assembly			CT 31022/A	
L5		Coil Assembly			CT 34745/A	
L6		Coil Assembly			CT 31021/A	
L7		Coil Assembly			CT 31020/A	
		Transistors				
VT1		n.p.n.			900893	S.T.C. BSY27
VT2		n.p.n.			900893	S.T.C. BSY27
VT3		n.p.n.			909111	Texas 2N3478
		Diodes				
1D1		(mounted on the module)			908349	Hughes HD1871
D1-D4		Diode Quad on circuit board			909846	Cosem A505GE
		Plugs and Sockets				
PL1		(Plug Shell			908388	Cannon DBM9W4P
		(Plug coaxial inserts (4)			908341	Cannon DM53740-5001

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		FIRST V.F.O.				
		(BC.28120) - Fig.5				
		Resistors				
Oscillator Board (1st. V.F.O.) (AC.35195)						
	ohms		watts			
R1	100	Metal Oxide		5	908276	Electrosil TR4
R2	10	Composition	0.1	10	902484	Morganite XL
R3	4.7k	Metal Oxide		5	900989	Electrosil TR4
R4	6.8k	Metal Oxide		5	900987	Electrosil TR4
R5	68	Metal Oxide		5	908278	Electrosil TR4
R6	10k	Metal Oxide		5	900986	Electrosil TR4
Amplifier Board (1st V.F.O.) (AC.32535)						
R1	68	Metal Oxide		5	908278	Electrosil TR4
R2	1.5k	Metal Oxide		5	908296	Electrosil TR4
R3	8.2k	Metal Oxide		5	908275	Electrosil TR4
R4	5.6k	Metal Oxide		5	908273	Electrosil TR4
R5	10k	Metal Oxide		5	900986	Electrosil TR4
R6	4.7k	Metal Oxide		5	900989	Electrosil TR4
R7	56	Metal Oxide		5	908289	Electrosil TR4
R8	330	Metal Oxide		5	908268	Electrosil TR4
R9	220	Metal Oxide		5	900988	Electrosil TR4
R10	680	Metal Oxide		5	908390	Electrosil TR4
R11	100	Composition	0.1	10	902496	Erie 15
Amplifier Board (1st V.F.O.) (AC.28128)						
R1	68	Metal Oxide		5	908278	Electrosil TR4
R2	1.5k	Metal Oxide		5	908296	Electrosil TR4
R3	8.2k	Metal Oxide		5	908275	Electrosil TR4
R4	5.6k	Metal Oxide		5	908273	Electrosil TR4
R5	10k	Metal Oxide		5	900986	Electrosil TR4
R6	4.7k	Metal Oxide		5	900989	Electrosil TR4
R7	56	Metal Oxide		5	908289	Electrosil TR4
R8	330	Metal Oxide		5	908268	Electrosil TR4
R9	68	Metal Oxide		5	908278	Electrosil TR4
R10	680	Metal Oxide		5	908390	Electrosil TR4
		Capacitors				
Module Assembly			volts	%		
1C1		Megahertz tuning			CA.27752/A	
1C2	.047	Ceramic	200		908722	Erie Filtercon 1201-051

Cct. Ref.	Value	Description	Rat.	Tol %	Racal Part No.	Manufacturer
		FIRST V.F.O. (Continued)				
Oscillator Board (AC.35195)						
C1	6.8p	Ceramic	750	½p	902075	Erie N750A
C2	8.5p	Trimmer			908732	Erie 562-013
C3	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C4	390p	Polystyrene	30	5	906710	Suflex HS7/A
C5	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C6	.0015	Ceramic	350	20	902124	Lemco 310K
Amplifier Board (AC.32535)						
C1	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C2	470p	Polystyrene	30	5	908396	Suflex HS7/A
C3	.0033	Ceramic Hi k	350	20	902128	Lemco 310K
C4	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C5	6.8p	Ceramic	750	½p	902075	Lemco 310N750
C6	47p	Polystyrene	30	2½p	908318	Suflex HS7/A
C7	.001	Disc Ceramicon	500	-20+80	908832	Erie K7004/861
C8	.002	Disc Ceramicon	500	-20+80	915099	Erie K800011/861
C9	82p	Polystyrene	30	2½	908322	Suflex HS7/A
Amplifier Board (AC.28128)						
NOTE:- Capacitors C1-C7 are identical to the Amplifier board AC.32535 above.						
C8	.001	Disc Ceramicon	500	-20+80	908832	Erie K7004/861
C9	82p	Polystyrene	30	2½	908322	Suflex HS7/A
C10	.001	Disc Ceramicon	500	-20+80	908832	Erie K7004/861
		Transformers and Inductors				
L1		Oscillator coil assembly			CT 28220/A	
		Transistors				
Oscillator Board						
VT1		p.n.p.			910866	Texas GM 290A
Amplifier Board (AC.32535)						
VT1		p.n.p.			914137	Texas GM 290A-R2044
VT2		p.n.p.			915512	Texas GM 290A-R2125
Amplifier Board (AC.28128)						
VT1		p.n.p.			915512	Texas GM 290A-R2125
VT2		p.n.p.			914137	Texas GM 290A-R2044
		Plugs and Sockets				
PL1		Cable and connector assembly			AA 33091/9	
PL2		Cable and connector assembly			AA 33091/6	
		Ferrite Beads				
FX1 (AC.32535 & AC.28128)					907488	Mullard FX 1242

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
			SECOND V.F.O.			
			(CC.28101/B) - Fig.10.			
		Resistors				
Fine Tune Board						
	ohms		watts	%		
2R1	47k	Metal Oxide		5	908391	Electrosil TR4
Oscillator Board (BC.35808)						
R1	100	Metal Oxide		5	908276	Electrosil TR4
R2	390	Metal Oxide		5	908472	Electrosil TR4
R3	2.2k	Metal Oxide		5	908270	Electrosil TR4
R4	27k	Metal Oxide		5	908295	Electrosil TR4
R5	390	Metal Oxide		5	908472	Electrosil TR4
R6	270	Metal Oxide		5	908284	Electrosil TR4
R7	390	Metal Oxide		5	908472	Electrosil TR4
R8	150	Metal Oxide		5	909121	Electrosil TR4
Amplifier Board (BC.35807)						
R1	150k	Metal Oxide		5	908277	Electrosil TR4
R2	1.8k	Metal Oxide		5	908283	Electrosil TR4
R3		not used				
R4	1.8k	Metal Oxide		5	908283	Electrosil TR4
R5	150k	Metal Oxide		5	908277	Electrosil TR4
R6	75	Metal Oxide		5	908288	Electrosil TR4
R7	6.8k	Metal Ocide		5	900987	Electrosil TR4
R8	1k	Metal Oxide		5	908267	Electrosil TR4
R9	1k	Metal Oxide		5	908267	Electrosil TR4
R10	470	Metal Oxide		5	900992	Electrosil TR4
R11	82	Metal Oxide		5	908290	Electrosil TR4
R12	18	Composition	0.1	10	902487	Erie 15
R13	68	Metal Oxide		5	908278	Electrosil TR4
R14	10k	Metal Oxide			900986	Electrosil TR4
R15	27k	Metal Oxide			908295	Electrosil TR4
R16	220	Metal Oxide			900988	Electrosil TR4
R17	22	Composition	0.1	10	902488	Erie 15
R18	1k	Metal Oxide		5	908267	Electrosil TR4
R19	4.7k	Metal Oxide		5	900989	Electrosil TR4
R20	27k	Metal Oxide		5	908295	Electrosil TR4
R21	100	Metal Oxide		5	908276	Electrosil TR4
R22	75	Metal Oxide		5	908288	Electrosil TR4

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		SECOND V.F.O. (continued)				
		Capacitors				
Module Assembly			volts			
1C1		kHz tuning			CA 30948/A	
1C2	8.5p	kHz tuning trimmer			908732	Erie 562-013
Fine Tune Board						
2C1	0.1	Polyester	250	20	909428	Mullard C280AE/P100K
Oscillator Board (BC.35808)						
C1	.01	Ceramicon	100	-20+80	900067	Erie K800011/CD801
C2	.01	Ceramicon	100	-20+80	900067	Erie K800011/CD801
C3	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C4	47p	Ceramicon	750	2½	912898	Erie N150 Style B
C5	22p	Ceramicon	750	2½	See Note	Erie NP0
	NOTE:	C5 is selected by test for suitable temperature coefficient. The standard component (NP0) has zero coefficient. The type actually fitted may be in the Erie range P100 (+ve t.c.) or N080 to N750 (-ve t.c.)				
Amplifier Board						
C1	1	Tantalum	35	20	909123	U. Carbide KIJ35S
C2	.01	Polyester	250	20	910485	Mullard C280 AE/P10K
C3	1	Tantalum	35	20	909123	U. Carbide KIJ35S
C4	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C5	.01	Polyester	250	20	910485	Mullard C280 AE/P10K
C6	.01	Polyester	250	20	910485	Mullard C280 AE/P10K
C7	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C8	.01	Polyester	250	20	910485	Mullard C280 AE/P10K
C9	.01	Polyester	250	20	910485	Mullard C280 AE/P10K
C10	.047	Polyester	250	20	909227	Mullard C280 AE/P10K
		Inductors				
NOTE:	L2 is not mounted on a board.					
L1		not fitted				
L2		Oscillator coil			CT 35809/A	
		Transistors				
Oscillator						
VT1		n.p.n.			906517	Texas 2N918
Amplifier Board						
VT1		n.p.n.			906517	Texas 2N918
VT2		n.p.n.			906517	Texas 2N918
VT3		n.p.n.			906517	Texas 2N918

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		SECOND V.F.O. (continued)				
		Diodes				
Fine Tune Board						
2D1 and 2D2		Variable capacitance diodes (15pF)			911878	Motorola MV830
Oscillator Board						
D1		Zener 7.5V ±5%			900897	Mullard OAZ245
D2		Zener 7.5V ±5%			900897	Mullard OAZ245
D3		Zener 6.2V ±5%			905395	Mullard OAZ243
D4		Zener 6.2V ±5%			905395	Mullard OAZ243
Amplifier Board						
D1		not used				
D2 and D3					908343	Texas 1S920
		Plugs and Sockets				
PL1		Multi-way connector			908716	Cannon DBM13W3P
		Coaxial inserts for PL1(3 off)			908341	Cannon DM53740-5001
Fine Tune Component Board Assembly containing 2R1, 2C1, 2D1 and 2D2					AA39599/A	

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		37.5 MHz GENERATOR (BC.28284/B) - Fig.7				
		Resistors				
Harmonic Generator (AC.32854)						
	ohms					
R1	1.8k	Metal Oxide		5	908283	Electrosil TR4
R2	1.2k	Metal Oxide		5	908285	Electrosil TR4
R3	820	Metal Oxide		5	908282	Electrosil TR4
R4	390	Metal Oxide		5	908472	Electrosil TR4
R5	390	Metal Oxide		5	908472	Electrosil TR4
Harmonic Mixer (AC.37894)						
R1	270	Metal Oxide		5	908284	Electrosil TR4
R2	56	Metal Oxide		5	908289	Electrosil TR4
R3	15k	Metal Oxide		5	908280	Electrosil TR4
R4	5.6k	Metal Oxide		5	908273	Electrosil TR4
R5	120	Metal Oxide		5	908286	Electrosil TR4
R6	6.8k	Metal Oxide		5	900987	Electrosil TR4
R7	5.6k	Metal Oxide		5	908273	Electrosil TR4
R8	15k	Metal Oxide		5	908280	Electrosil TR4
R9	120	Metal Oxide		5	908286	Electrosil TR4
R10	820	Metal Oxide		5	908282	Electrosil TR4
37.5 MHz Amplifier (AC.32850)						
R1	4.7k	Metal Oxide		5	900989	Electrosil TR4
R2	4.7k	Metal Oxide		5	900989	Electrosil TR4
R3	47k	Metal Oxide		5	908391	Electrosil TR4
R4	680	Metal Oxide		5	908390	Electrosil TR4
R5	12k	Metal Oxide		5	908274	Electrosil TR4
R6	8.2k	Metal Oxide		5	908275	Electrosil TR4
		Potentiometer				
RV1	2.2k	Mixer Balance adjustment			909838	Ancillary Developments Type TO.5
		Capacitors				
1C1	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
1C2	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		37.5 MHz GENERATOR (continued)				
Harmonic Generator (AC.32854)						
			volts			
C1	4.5/15p	Trimmer			908796	Steatite Triko 7SOZ N750
C2	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C3	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C4	.01	Polyester	250	20	910485	Mullard C280 AE/P10K
C5	100p	Polystyrene	30	2½	908797	Suflex HS7/A
Harmonic Filter (AC.32862 and AC.32548)						
C1	22p	Polystyrene		±1p	906703	Suflex HS7/A
C2	2.5-6p	Pre-set Ceramic sub-micro			907886	Steatite Triko 7SONO33
C3	27p	Polystyrene		±1p	908325	Suflex HS7/A
C4	7-35p	Pre-set Ceramic sub-micro			908806	Steatite Triko 7S02N1500
C5	27p	Polystyrene		±1p	908325	Suflex HS7/A
C6	2.5-6p	Pre-set Ceramic sub-micro			907886	Steatite Triko 7S02NO33
C7	27p	Polystyrene		±1p	908325	Suflex HS7/A
C8	7-35p	Pre-set Ceramic sub-micro			908806	Steatite Triko 7S02N1500
C9	18p	Polystyrene		±1p	907171	Suflex HS7/A
Harmonic Mixer (AC.37894)						
C1	0.1	Polyester	250	10	909428	Mullard C280 AE/P100K
C2	0.1	Polyester	250	10	909428	Mullard C280 AE/P100K
C3	.01	Ceramic	100	-20+80	909102	Erie K800011 CD801
C4	.01	Ceramic	100	-20+80	909102	Erie K800011 CD801
C5	.01	Ceramic	100	-20+80	909102	Erie K800011 CD801
C6	.01	Ceramic	100	-20+80	909102	Erie K800011 CD801
37.5 MHz Amplifier (AC.32850)						
C1	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C2	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C3	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C4	68p	Polystyrene	30	2½	908321	Suflex HS7/A
C5	0.1	Polyester	250	10	909847	Mullard C280 AE/P100K
C6	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C7	15p	Ceramic	750	5	902047	Lemco 310NP0
		Transformers and Inductors				
Harmonic Filter (AC.32862 and AC.32548)						
L1		Coil Assembly			CT 32956/A	
L2		Coil Assembly			CT 32954/A	
L3		Coil Assembly			CT 32956/A	
L4		Coil Assembly			CT 32954/A	

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		37.5 MHz GENERATOR (continued)				
Harmonic Mixer (AC.37894)						
L1		Coil Assembly inc. C7 & C8			CT 32957/A	
37.5 MHz Amplifier (AC.32850)						
T1		Coil assembly inc. capacitor C4			CT 28317/A	
		Transistors				
Harmonic Generator						
VT1		p.n.p.			910866	Texas GM290A
Harmonic Mixer						
VT1 and VT2		p.n.p.			910866	Texas GM290A
37.5 MHz Amplifier						
VT1		p.n.p.			910866	Texas GM290A
VT2		p.n.p.			910866	Texas GM290A
		Diodes				
Harmonic Generator						
D1					908347	Hughes HG 5085
D2					908347	Hughes HG 5085
37.5 MHz Amplifier						
D1 and D2					908347	Hughes HG 5085
		Plugs and Sockets				
PL1		Connects to bulkhead adaptor			908370	Belling Lee L1403/RFP/Ag
SKT1		Connects to PL1 on 37.5 MHz Filter Unit			907076	Cannon insert DM53742-5001
		Ferrite Beads				
FB1		On H.T. Filter			900461	Mullard FX 1115
		37.5 MHz Filter				
NOTE: If this unit is faulty a replacement should be obtained from the Racal Service Department quoting Part number BA.28192.						
		Plugs (fixed)				
PL1		Coaxial insert			908341	Cannon DM 53740-5001
PL2		Coaxial insert			908341	Cannon DM 53740-5001

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer

1 MHz AMP. OSC. & CALIBRATOR

(CC 28285/B - Fig.6)

Note: This assembly is contained in the 37.5 MHz Generator Module.

Resistors

	ohms		watts			
1R1	56	Metal Oxide		5	910545	Welwyn F25
1R2	22k	Metal Oxide		5	908289	Electrosil TR4
1MHz Amplifier Board (BC.32858)						
R1	22k	Metal Oxide		5	908269	Electrosil TR4
R2	6.8k	Metal Oxide		5	900987	Electrosil TR4
R3	1k	Metal Oxide		5	908267	Electrosil TR4
R4	820	Metal Oxide		5	908282	Electrosil TR4
R5	10	Composition		10	902484	Erie 15
R6	1k	Metal Oxide		5	908267	Electrosil TR4
R7	8.2k	Metal Oxide		5	908275	Electrosil TR4
R8	6.8k	Metal Oxide		5	900987	Electrosil TR4
R9	33	Composition	0.1	10	902490	Erie 15
R10	560	Metal Oxide		5	909841	Electrosil TR4
R11	33	Metal Oxide		5	908690	Electrosil TR4
R12	1k	Metal Oxide		5	908267	Electrosil TR4
R13	18k	Metal Oxide		5	900994	Electrosil TR4
R14	5.6k	Metal Oxide		5	908273	Electrosil TR4
R15	1.5k	Metal Oxide		5	908296	Electrosil TR4
R16	1.2k	Metal Oxide		5	908285	Electrosil TR4
R17	39k	Metal Oxide		5	908292	Electrosil TR4
R18	82	Metal Oxide		5	908290	Electrosil TR4
R19	68	Metal Oxide		5	908278	Electrosil TR4
Calibrator Board (BC 41745)						
R1	33k	Metal Oxide		5	908291	Electrosil TR4
R2	10k	Metal Oxide		5	900986	Electrosil TR4
R3	2.2k	Metal Oxide		5	908270	Electrosil TR4
R4	100	Metal Oxide		5	908276	Electrosil TR4
R5	6.8k	Metal Oxide		5	900987	Electrosil TR4
R6	2.2k	Metal Oxide		5	908270	Electrosil TR4
R7	68	Metal Oxide		5	908278	Electrosil TR4
R8	1.2k	Metal Oxide		5	908285	Electrosil TR4
R9	27k	Metal Oxide		5	908295	Electrosil TR4
R10	4.7k	Metal Oxide		5	900989	Electrosil TR4

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		1 MHz AMP. OSC. & CAL. (continued)				
	ohms		watts			
R11	330	Metal Oxide		5	908153	Electrosil TR4
R12	39k	Metal Oxide		5	908292	Electrosil TR4
R13	150k	Metal Oxide		5	908277	Electrosil TR4
R14	2.2k	Metal Oxide		5	908270	Electrosil TR4
		Capacitors	volts			
1C1	0.22				908338	TCC CML10
1C2	0.1		250	10	909847	Mullard C280AE/A100K
1MHz Amplifier Board (BC.32858)						
C1	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C2	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C3	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C4	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C5	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C6	0.1	Polyester	250	20	909428	Mullard C280 AE/P100K
C7	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C8	.001	Ceramic Hi-K	350	20	902122	Lemco 310K
C9	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C10 *	680p	Polystyrene	30	2½	908455	Suflex HS7/A (See Note)
C10 *	0.1	Polyester	250	20	909428	Mullard C280 AE/P100K
* NOTE:- In later production if VT3 is type 2N1396 then C10 becomes 0.1µF						
C11	150p	Polystyrene	30	2½	908331	Suflex HS7/A
C12	.0015	Ceramic Hi-K	350	20	902124	Lemco 310K
C13	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C14	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
Calibrator Board (BC.41745)						
C1	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C2	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C3	220p	Polystyrene	30	2½	908320	Suflex HS7/A
C4	.001	Polystyrene	30	2½	908583	Suflex HS7/A
C5	.001	Polystyrene	30	2½	908583	Suflex HS7/A
C6	22p	Polystyrene	30	1p	906703	Suflex HS7/A
C7	7-35p	Pre-set: Steatite Ceramic Sub-Micro	75		908806	Triko 02 N1500
C8	0.1	Polyester	250	10	909428	Mullard C280 AE/P100K
C9	0.1	Polyester	250	10	909428	Mullard C280 AE/P100K
C10	0.1	Polyester	250	10	909428	Mullard C280 AE/P100K
C11	2.5	Electrolytic			908808	Mullard C426A5/E2-5
C12	0.1	Polyester	250	10	909428	Mullard C280AE/P100K
C13	1200p	Polystyrene	30	2½	910645	Suflex HS7/B

Cct. Ref.	Value	Description	Rat.	Tol %	Racal Part No.	Manufacturer
		1 MHz AMP. OSC. & CAL. (continued)				
		Transformers and Inductors				
1MHz Amplifier Board (BC 32858)						
L1		Coil Assembly			CT 32955/A	
		Transistors				
1 MHz Amplifier Board (BC 32858)						
VT1		p.n.p.			909414	Motorola 2N3323
VT2		p.n.p.			909414	Motorola 2N3323
VT3		p.n.p.(earlier versions only)			909414	Motorola 2N3323
VT3		p.n.p.(fitted in later versions)			915244	Amperex 2N1396
Calibrator Board (BC 41745)						
VT1		p.n.p.			909414	Motorola 2N3323
		Diodes				
1 MHz Amplifier Board (BC 32858)						
D1		Semi-conductor			900620	Mullard OA200
Calibrator Board (BC 41745)						
D1		Semi-conductor			900652	Mullard AAZ13
		Integrated Circuits				
Calibrator Board (BC 41745)						
IC1					915471	S.C.S.CμL 9958
		Plugs and Sockets				
PL1		(Plug shell			908388	Cannon DBM9W4P
		(Plug inserts (2)			907080	Cannon DM53741-5001
		Crystals				
XL1		1 MHz crystal Style D			CD 38871/1	
		Crystal Holder			900397	X2/UG

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		B.F.O. - Fig.13				
		Resistors				
600 kHz Oscillator Board (BC.30540)						
	ohms					
R1	220	Metal Oxide		5	900988	Electrosil TR4
R2	5.6k	Metal Oxide		5	908273	Electrosil TR4
R3	5.6k	Metal Oxide		5	908273	Electrosil TR4
R4	5.6k	Metal Oxide		5	908273	Electrosil TR4
R5	10k	Metal Oxide		5	900986	Electrosil TR4
Amplifier Board (BC.30542)						
R1	5.6k	Metal Oxide		5	908273	Electrosil TR4
R2	15k	Metal Oxide		5	908280	Electrosil TR4
R3	1k	Metal Oxide		5	908267	Electrosil TR4
R4	180	Metal Oxide		5	909125	Electrosil TR4
R5	4.7k	(part of CT 35217/A)		10	908246	Nutec RKL10
		Capacitors				
B.F.O. Assembly			volts			
1C1	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
1C2	4-20p	B.F.O. Variable tuning			AD 38584	
600 kHz Oscillator Board (BC 30540)						
C1	0.1	Polyester	250	10	909428	Mullard C280 AE/P100K
C2	7-35p	pre-set			908806	Steatite 7S Triko 02/N1500
C3	7-35p	pre-set			908806	Steatite 7S Triko 02/N1500
C4		not used				
C5	7-35p	pre-set			908806	Steatite 7S Triko 02/N1500
C6	7-35p	pre-set			908806	Steatite 7S Triko 02/N1500
C7	390p	Polystyrene	30	2½	908243	Suflex HS7/A
C8	82p	Ceramic	750	2	902099	Erie N750B
C9	0.1	Polyester	250	20	909428	Mullard C280 AE/P100K
C10	.01	Polyester	250	20	910485	Mullard C280 AE/P10K
C11	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
Amplifier Board (BC.30542)			volts			
C1	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C2*	180p	Polystyrene	30	2½	907884	Suflex HS7/A
C3	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K

* C2 is part of transformer assembly CT 35216/A

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		B.F.O. (continued)				
		Transformers and Inductors				
600 kHz Oscillator Board						
L1		Oscillator coil			CT 35217/A	
Amplifier Board						
T1		600 kHz output transformer			CT 35216/A	
		Switches				
SB		DET-B.F.O. Mode switch			BSW 38585	
		Transistors				
600 kHz Oscillator Board						
VT1		n.p.n.			906433	S.T.C. BSY95A
Amplifier Board						
VT1		n.p.n.			906433	S.T.C. BSY95A

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		1st I.F. AMPLIFIER UNIT				
		(BC 31474)				
	NOTE:	This unit is a small module located adjacent to the crystal bandwidth filters (Fig. 18) The circuit is shown in Fig. 11.				
		Resistors				
	ohms			%		
R1	18k	Metal Oxide		5	908272	Electrosil TR4
R2	100	Metal Oxide		5	908276	Electrosil TR4
R3	4.7k	Metal Oxide		5	900989	Electrosil TR4
R4	3.9k	Metal Oxide		5	900990	Electrosil TR4
R5	1k	Metal Oxide		5	908267	Electrosil TR4
R6	470	Metal Oxide		5	900992	Electrosil TR4
R7	10	Composition	0.1	10	902484	Erie 15
		Capacitors				
			volts			
C1	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C2	.047	Polyester	250	20	909227	Mullaed C280 AE/P47K
C3*	180p	Polystyrene	30	2½	907884	Suflex HS7/A
C4	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C5*	.01	Silver Mica	500	20	908245	Erie Microcap
C6*	.01	Silver Mica	500	20	908245	Erie Microcap
* Contained in L1 assembly						
		Inductors				
L1		Coil Assembly			CT 31472/A	
		Transistor				
VT1		p.n.p.			909414	Motorola 2N3323

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
			MAIN I.F. MODULE - Fig.12			
		Resistors				
	ohms			%		
2R1	1k	Metal Oxide		5	908267	Electrosil TR4
2R2		not used				
2R3	120	Metal Oxide		5	908286	Electrosil TR4
NOTE: 2R1 and 2R3 are not mounted on a board.						
H.T. Supply Filter (AC 30535)						
R1	100	Metal Oxide		5	908276	Electrosil TR4
I.F. Amplifier Board (BC.30533)						
R1	18k	Metal Oxide		5	908272	Electrosil TR4
R2	3.9k	Metal Oxide		5	900990	Electrosil TR4
R3	330	Metal Oxide		5	908268	Electrosil TR4
R4	4.7k	Carbon Film		10	908246	Nutec RKL10
R5	33	Metal Oxide		5	908690	Electrosil TR4
R6	1k	Metal Oxide		5	908267	Electrosil TR4
R7	22k	Metal Oxide		5	908269	Electrosil TR4
R8	4.7k	Metal Oxide		5	900989	Electrosil TR4
R9	2.2k	Metal Oxide		5	908270	Electrosil TR4
R10	5.6k	Metal Oxide		5	908273	Electrosil TR4
R11	4.7k	Metal Oxide		5	900989	Electrosil TR4
R12	3.9k	Metal Oxide		5	900990	Electrosil TR4
R13	10k	Metal Oxide		5	900986	Electrosil TR4
R14	220	Metal Oxide		5	900988	Electrosil TR4
R15	8.2k	Metal Oxide		5	908275	Electrosil TR4
R16	4.7k	Carbon film		10	908246	Nutec RKL10
R17	3.9k	Metal Oxide		5	900990	Electrosil TR4
R18	12k	Metal Oxide		5	908274	Electrosil TR4
R19	330	Metal Oxide		5	908268	Electrosil TR4
R20	4.7k	Carbon Film		10	908246	Nutec RKL10
R21	47	Metal Oxide		5	908298	Welwyn F25
R22	1k	Metal Oxide		5	908267	Electrosil TR4
Detector Board (CC.28236)						
R1	3.9k	Metal Oxide		5	900990	Electrosil TR4
R2	33k	Metal Oxide		5	908291	Electrosil TR4
R3	39k	Metal Oxide		5	908292	Electrosil TR4
R4	5.6k	Metal Oxide		5	908273	Electrosil TR4
R5	56	Metal Oxide		5	908289	Electrosil TR4

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		I.F. MODULE (continued)				
Detector Board						
R6	100	Metal Oxide		5	908276	Electrosil TR4
R7	2.2k	Metal Oxide		5	908270	Electrosil TR4
R8	330	Metal Oxide		5	908268	Electrosil TR4
R9	10k	Metal Oxide		5	900986	Electrosil TR4
R10		Not used				
R11	4.7k	Metal Oxide		5	900989	Electrosil TR4
R12	820	Metal Oxide		5	908282	Electrosil TR4
R13	100k	Metal Oxide		5	908293	Electrosil TR4
R14	4.7k	Metal Oxide		5	900989	Electrosil TR4
R15	1k	Metal Oxide		5	908267	Electrosil TR4
R16	33	Composition	0.1	10	902490	Erie 15
R17	6.8k	Carbon Film		10	908247	Nutec RKL10
R18	2.7k	Metal Oxide		5	908294	Electrosil TR4
R19	15k	Metal Oxide		5	908280	Electrosil TR4
R20	100	Metal Oxide		5	908276	Electrosil TR4
R21	2.2k	Metal Oxide		5	908270	Electrosil TR4
R22	5.6k	Metal Oxide		5	908273	Electrosil TR4
R23	33k	Metal Oxide		5	908291	Electrosil TR4
R24	3.9k	Metal Oxide		5	900990	Electrosil TR4
R25	15k	Metal Oxide		5	908280	Electrosil TR4
R26	1.2k	Metal Oxide		5	908285	Electrosil TR4
R27	6.8k	Metal Oxide		5	900987	Electrosil TR4
R28	22k	Metal Oxide		5	908269	Electrosil TR4
R29		Not used				
R30		Not used				
R31	82	Metal Oxide		5	908290	Electrosil TR4
R32	5.6k	Metal Oxide		5	908273	Electrosil TR4
R33	5.6k	Metal Oxide		5	908273	Electrosil TR4
AGC Board (BC.31466/B)						
R1	15k	Metal Oxide		5	908280	Electrosil TR4
R2	3.9k	Metal Oxide		5	900990	Electrosil TR4
R3	330	Metal Oxide		5	908268	Electrosil TR4
R4	5.6k	Carbon Film		10	910488	Nutec RKL10
R5	22	Composition	0.1	10	902488	Erie 15
R6	1k	Metal Oxide		5	908267	Electrosil TR4
R7	18k	Metal Oxide		5	908272	Electrosil TR4
R8	12k	Metal Oxide		5	908274	Electrosil TR4
R9	1k	Metal Oxide		5	908267	Electrosil TR4
R10	18	Composition	0.1	10	902487	Erie 15

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		I.F. MODULE (continued)				
A.G.C. Board						
R11	10k	Carbon Film		10	908249	Nutec RKL10
R12	150k	Metal Oxide		5	908277	Electrosil TR4
R13	120k	Metal Oxide		5	908281	Electrosil TR4
R14	10k	Metal Oxide		5	900986	Electrosil TR4
R15	10k	Metal Oxide		5	900986	Electrosil TR4
R16	120k	Metal Oxide		5	908281	Electrosil TR4
R17	68k	Metal Oxide		5	908279	Electrosil TR4
R18	820k	Composition	0.1	10	902543	Erie 15
R19	1k	Metal Oxide		5	908267	Electrosil TR4
R20	2.2k	Metal Oxide		5	908270	Electrosil TR4
R21	6.8k	Metal Oxide		5	900987	Electrosil TR4
R22	15k	Metal Oxide		5	908280	Electrosil TR4
R23	820	Metal Oxide		5	908282	Electrosil TR4
R24	3.3k	Metal Oxide		5	900991	Electrosil TR4
R25	470	Metal Oxide		5	900992	Electrosil TR4
Converter Amplifier Board (BC 34783/VAR) (Top Board)						
R1	6.8k	Metal Oxide		5	900987	Electrosil TR4
R2	1.8k	Metal Oxide		5	908283	Electrosil TR4
R3	100	Metal Oxide		5	908276	Electrosil TR4
R4	270	Metal Oxide		5	908284	Electrosil TR4
R5	1k	Metal Oxide		5	908267	Electrosil TR4
R6	100	Metal Oxide		5	908276	Electrosil TR4
R7	15k	Metal Oxide		5	908280	Electrosil TR4
R8	100	Metal Oxide		5	908276	Electrosil TR4
R9	1.2k	Metal Oxide		5	908285	Electrosil TR4
R10*	56k	Metal Oxide		5	908287	Electrosil TR4
R11	120	Metal Oxide		5	908286	Electrosil TR4

* R10 is fitted only to the 100 kHz board BC 34783/B

Converter Oscillator Board (BC 38568/VAR) (Bottom Board)

NOTE: Except for R12, resistor details are identical in the 100 kHz (B) and 455 kHz (A) versions.

	ohms					
R1	100	Metal Oxide		5	908276	Electrosil TR4
R2	68k	Metal Oxide		5	908279	Electrosil TR4
R3	390	Metal Oxide		5	908472	Electrosil TR4
R4	4.7k	Metal Oxide		5	900989	Electrosil TR4
R5	22k	Metal Oxide		5	908269	Electrosil TR4

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		I.F. MODULE (continued)				
R6	1k	Metal Oxide		5	908267	Electrosil TR4
R7	3.3k	Metal Oxide		5	900991	Electrosil TR4
R8	18k	Metal Oxide		5	908272	Electrosil TR4
R9	100	Metal Oxide		5	908276	Electrosil TR4
R10	1k	Metal Oxide		5	908267	Electrosil TR4
R11	33	Metal Oxide		5	908690	Electrosil TR4
R12	39k	Metal Oxide		5	908292	Electrosil TR4
R12	82k	Metal Oxide		5	908691	Electrosil TR4
Note: R12 is 39k (100kHz) or 82k (455kHz)						
		Potentiometer				
AGC Board						
RV1	2.2M				908365	Plessey Type MP
		Capacitors				
Module			volts			
2C1	0.22	Ceramic	50	-20+50	908338	T.C.C. CML10
2C2	0.22	Ceramic	50	-20+50	908338	T.C.C. CML10
H.T. Supply Filter (AC.30535)						
C1	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C2	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
I.F. Amplifier Board (BC.30533)						
C1	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C2	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C3	10	Electrolytic	16	-10+50	900068	Mullard C426 AR/E10
C4	180p	Polystyrene	30	2½	907884	Suflex HS7/A
C5	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C6	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C7	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C8	180p	Polystyrene	30	2½	907884	Suflex HS7/A
C9	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C10	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C11	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C12	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C13	180p	Polystyrene	30	2½	907884	Suflex HS7/A
C14	50	Electrolytic	16	-10+50	908798	Mullard C426 ARF50
C15	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C16	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C17	100p	Polystyrene	30	2½	908241	Suflex HS7/A
Detector Board (CC.28236)						
C1	180p	Polystyrene	30	2½	907884	Suflex HS7/A
C2	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C3	10	Electrolytic	16	-10+50	900068	Mullard C426 AR/E10
C4	120p	Polystyrene	30	2½	908332	Suflex HS7/A
C5	10	Electrolytic	16	-10+50	900068	Mullard C426 AR/E10

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
Detector Board		I.F. MODULE (continued)				
C6	120p	Polystyrene	30	2½	908332	Suflex HS7/A
C7	10	Electrolytic	16	-10+50	900068	Mullard C426 AR/E10
C8	120p	Polystyrene	30	2½	908332	Suflex HS7/A
C9	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C10	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
C11	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
C12	100p	Polystyrene	30	2½	908241	Suflex HS7/A
C13	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C14	180p	Polystyrene	30	2½	907884	Suflex HS7/A
C15	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
C16	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
C17	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C18	330p	Silver Mica	350	2	902173	J.M.C. CX22S/350
C19	.01	Ceramic	100	-20+80	900067	Erie CD801
C20	.0022	Ceramic	350	20	902126	Lemco 310K
C21	7-35p	Variable			908806	Steatite Triko 02/N1500
C22	7-35p	Variable			908806	Steatite Triko 02/N1500
C23	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
C24	0.1	Ceramic	30	-25+50	906675	Erie 811T/30
C25	10p	Polystyrene	30	2½	908324	Suflex HS7/A
C26	10p	Polystyrene	30	2½	908324	Suflex HS7/A
AGC Board (BC 31466/B)						
C1	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C2	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C3	.0086	Silver Mica	125	2	908337	S.T.C. 454LWA-74
C4	330p	Polystyrene	30	2½	908242	Suflex HS7/A
C5	.047	Polyester	250	20	909227	Mullard AE/P47K
C6	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C7	33p	Polystyrene	30	1p	906497	Suflex HS7/A
C8	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C9	180p	Polystyrene	30	2½	907884	Suflex HS7/A
C10	390p	Polystyrene	30	2½	908243	Suflex HS7/A
C11	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C12	0.22	Ceramic	50	-10+50	908338	T.C.C. CML10
C13	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C14	6.4	Electrolytic	25	-10+50	905371	Mullard C426 AR/F6.4
C15	0.64	Electrolytic	64	-10+50	909311	Mullard C426 AS/H0.64
C16	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C17	50	Electrolytic	25	-10+50	908798	Mullard C426 AR/F50

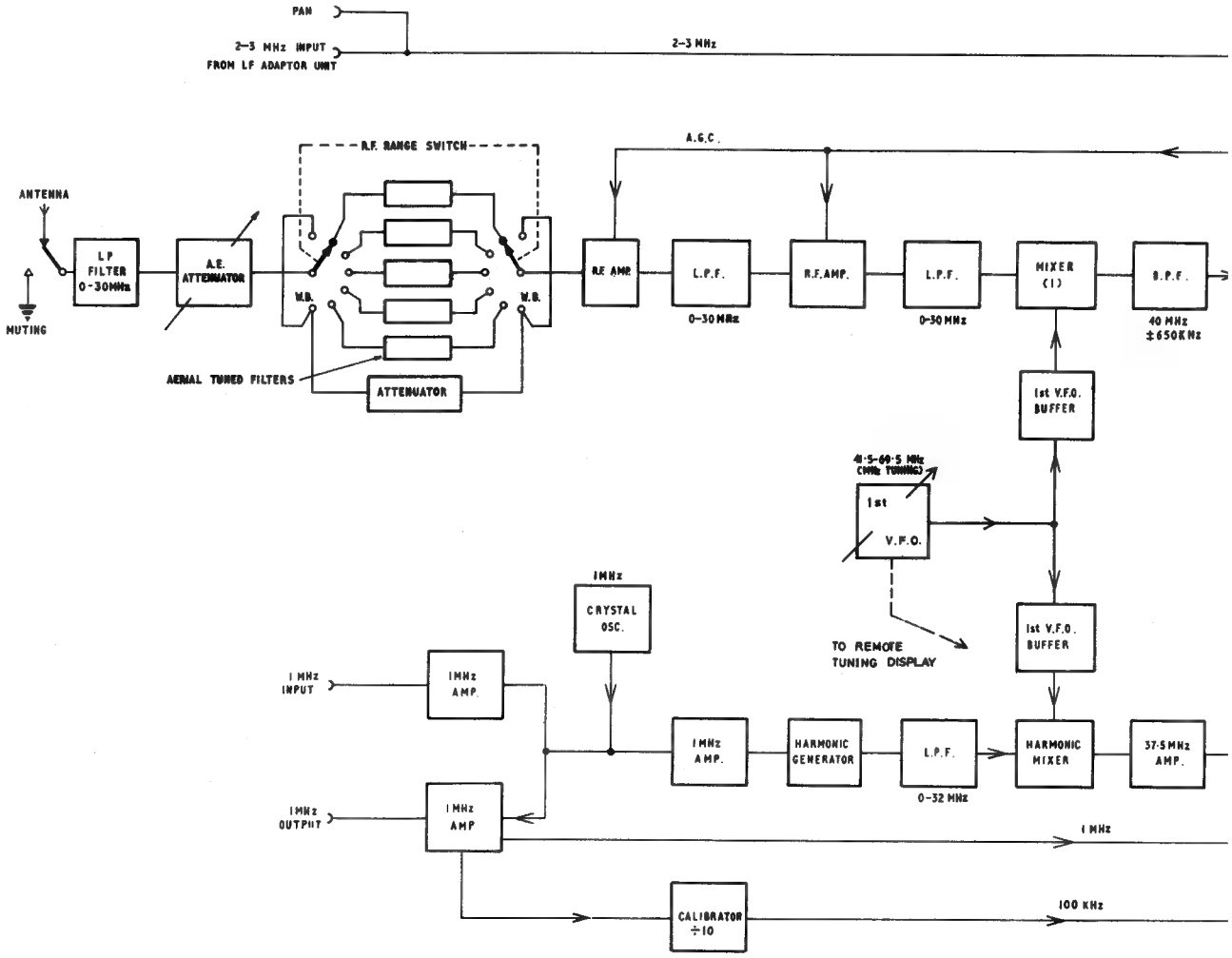
Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		I.F. MODULE (continued)				
		Converter Amplifier Board (BC 34783/VAR) (Top Board)				
C1	.0033	Ceramic	100	10	912634	Erie 8003 W5R
C2	330p	Polystyrene	30	2½	908242	Suflex HS7/A
C3	82p	Ceramic	50	10	912637	Erie 831 N2200
C4	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C5	470p	Ceramic	100	10	912635	Erie 8003 W5R
C6	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C7	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C8	470p	Polystyrene	30	2½	908317	Suflex HS7/A
C9	2.2	Tantalum	20	20	908316	U. Carbide K2R2J20S
		Converter Oscillator Board (BC 38568/VAR) (Bottom Board)				
		NOTE: Except for C9 the capacitor details are identical for the 100 kHz and 455 kHz versions.				
C1	.047	Polyester	250	20	909227	Mullard C280 AE/P47K
C2	6.8p	Ceramic	750	½p	902041	Lemco 310NP0
C3	150p	Polystyrene	30	2½	908331	Suflex HS7/A
C4	7-35p	Variable			908806	Steatite 7S Triko 02
C5	470p	Polystyrene	30	2½	908317	Suflex HS7/A
C6	0.64	Electrolytic	64	-10+50	909311	Mullard C426 AS/H0.64
C7	0.1	Polyester	250	10	909847	Mullard C280 AE/A100K
C8	470p	Polystyrene	30	2½	908317	Suflex HS7/A
C9	18p	Polystyrene	30	1p	907171	Suflex HS7/A
C9'	100p	Polystyrene	30	2½	908241	Suflex HS7/A
C10	470p	Polystyrene	30	2½	908317	Suflex HS7/A
		Note: C9 is 18p (455kHz) or 100p (100kHz)				
		I.F. Amplifier Board (BC 30533)				
L1		Coil Assembly			CT 33004/A	
L2		Coil Assembly			CT 33005/A	
L3		Coil Assembly			CT 33006/A	
		Detector Board				
T1		Transformer Assembly			CT 32961/A	
T2		Transformer Assembly			CT 33002/A	
L1		Not used				
L2		Coil Assembly			CT 31473/A	
L3		Coil Assembly			CT 32962/A	
		A.G.C. Board				
L1		Coil Assembly			CT 33008/A	
L2		Coil Assembly			CT 33007/A	

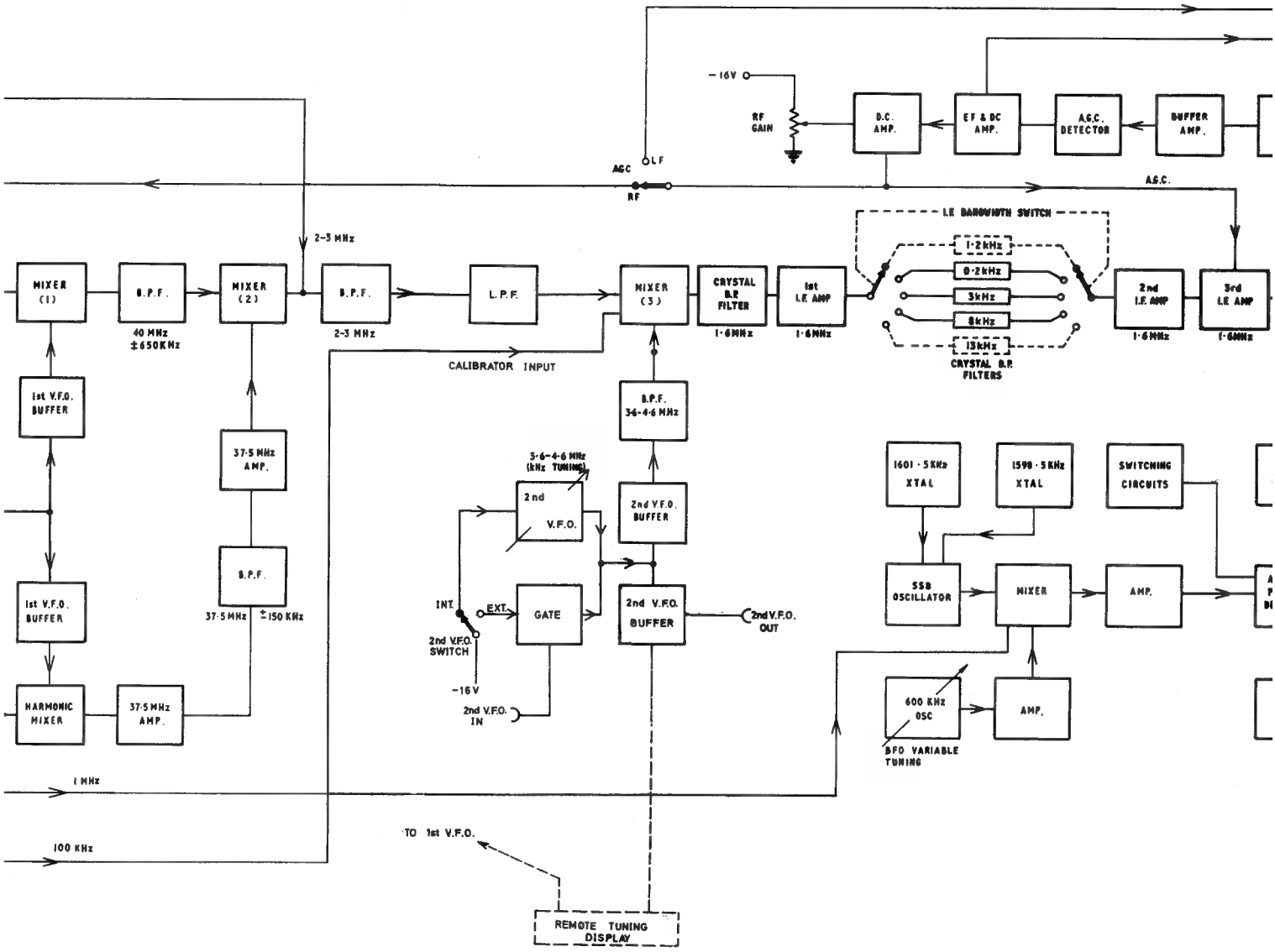
Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		I.F. MODULE (continued)				
Converter Amplifier Board						
L1		Coil Assembly (455 kHz)			CT 32958	
L1		Coil Assembly (100 kHz)			CT 34763/A	
Converter Oscillator Board						
L1		Coil Assembly (455 kHz)			CT 32959	
L1		Coil Assembly (100 kHz)			CT 34764/A	
L2		Coil Assembly (455 kHz)			CT 32960	
L2		Coil Assembly (100 kHz)			CT 34765/A	
		Transistors				
I.F. Amplifier Board						
VT1		p.n.p.			909414	Motorola 2N3323
VT2		p.n.p.			906370	Texas 2N2412
VT3		p.n.p.			909414	Motorola 2N3323
VT4		p.n.p			909414	Motorola 2N3323
Detector Board						
VT1		n.p.n.			906433	S.T.C. BSY95A
VT2		n.p.n.			900656	Texas 2S733
VT3		n.p.n.			906433	S.T.C. BSY95A
VT4		n.p.n.			906433	S.T.C. BSY95A
VT5		n.p.n.			906433	S.T.C. BSY95A
VT6		n.p.n.			906433	S.T.C. BSY95A
AGC Board						
VT1		p.n.p.			909414	Motorola 2N3323
VT2		n.p n.			906433	S.T.C. BSY95A
VT3		n.p.n.			910839	Texas 2N3707
VT4		n.p.n.			909413	S.T.C. 2N930
VT5		p.n.p.			909414	Motorola 2N3323
VT6		n.p n.			908361	Texas 2N1304
Converter Amplifier Board						
VT1		n.p.n.			906433	S.T.C. BSY95A
VT2		n.p.n.			911929	Mullard BC107
VT3		n.p.n.			911929	Mullard BC107
Converter Oscillator Board						
VT1		p.n.p.			909414	Motorola 2N3323
VT2		n.p.n.			906433	S.T.C. BSY95A

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		I.F. MODULE (continued)				
		Diodes				
Main I.F. Amplifier						
D1					908343	Texas 1S920
Detector Board						
D1					908343	Texas 1S920
D2					908343	Texas 1S920
D3		Not used			(900652	Mullard AAZ13 or
D4					(908349	Hughes HD1871
D5		Zener			908344	International MZ13T5
D6					908343	Texas 1S920
D7					908343	Texas 1S920
AGC Board						
D1					906720	Texas 1S44
D2					908343	Texas 1S920
D3					908343	Texas 1S920
D4		Zener			908344	International MZ13T5
		Plugs and Sockets				
I.F. Unit Module Connectors						
SKT4		Coax. Fixed I.F. Input			906878	Belling Lee L1403/CS/Ag
PL3		Plug, free, to mate with SKT4			908370	Belling Lee L1403/RFP/Ag
PL1		Main 37-way connector (fixed)			908674	Cannon DCF37P
1SKT1		Free 37-way connector			908603	Cannon DCM37S
I.F. Converter Panel						
SKT1		Coaxial: fixed			906878	Belling Lee L1403CS/Ag
SKT2		Coaxial: fixed			906878	Belling Lee L1403CS/Ag
SKT3		Coaxial: fixed			906878	Belling Lee L1403CS/Ag
		Crystals				
Detector Board						
XL1		1601.50 kHz			CD38871/B	
XL2		1598.50 kHz			CD38871/C	
Converter Oscillator Board (8)						
XL1		1145 kHz in 455 kHz Converter			CD38871/E	These crystals are not fitted in the RA.1218 receiver.
XL1		1700 kHz in 100 kHz Converter			CD38871/D	
Terminal Strip						
TB1		5-way - rear panel.			909928	Carr. Fastener 44-79-593-5M

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		POWER UNIT TYPE PU.1153 (AC/DC SUPPLY) - Fig.15a				
		(BC 38640)				
Component Board Assembly					BA37549	
		Components				
NOTE:	Components pre-fixed '1' are located on the chassis assembly. Those without prefix are on the component board.					
		Resistors				
1R1	100k	Metal Oxide		5	907866	Electrosil TR5
R1	1k	Metal Oxide		5	906031	Electrosil TR5
R2	1.8k	Metal Oxide		5	906026	Electrosil TR5
R3	2.2k	Metal Oxide		5	906020	Electrosil TR5
R4	2.7k	Metal Oxide		5	906347	Electrosil TR5
R5	2.7k	Metal Oxide		5	906347	Electrosil TR5
R6	1.2k	Metal Oxide		5	906346	Electrosil TR5
		Potentiometers				
1RV1	1.5k				908689	Colvern 1106/9S
	µF	**Capacitors**	volts			
1C1	.02	Paper	350	20	902279	Dubilier Minicap G15
1C2	.02	Paper	350	20	902279	Dubilier Minicap G15
1C3	500	Electrolytic	64	-10+50	906759	Mullard C431 BR/H500
1C4	500	Electrolytic	64	-10+50	906759	Mullard C431 BR/H500
1C5	100	Electrolytic	50		900506	Hunts MEFC43AT
C1	100	Electrolytic	6.4	-10+50	911691	Mullard C426 AR/C100
C2	0.1	Polyester	250	20	909428	Mullard C280 AE/P100K
		Transformer				
1T1		Mains power transformer				USA. D - 01650
		Transistors				
1VT1		High current: n.p.n.			906371	RCA 2N3055
VT1		p.n.p.			911565	Mullard BCY40
VT2		p.n.p.			911565	Mullard BCY40
		Diodes				
1D1		Zener: 18 volts			911123	Mullard OAZ234
D1		Encapsulated rectifier unit			909020	Motorola MDA 920/3
D2		Encapsulated rectifier unit			909020	Motorola MDA 920/3
D3		Zener: 6.8V		5	908348	Hughes HS2068
					914064	or Mullard BZY88C6V8
D4		Zener: 4.7V		5	909717	Mullard OAZ240

Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part No.	Manufacturer
		PU.1153 (Continued)				
		Switches				
1SA		Slider: panel			912063	E.M.I. Type S5
1SB		Slider: panel			912063	E.M.I. Type S5
		Connectors				
1SKT1		Socket: sub-miniature 15-way			908683	Cannon DAMF. 15.S
PL1		Plug: fixed 3-pin, brass			900011	Plessey Mk4 CZ63953/5
Socket, free, for power connection to PL1					905151	Plessey Mk4 2CZ83283/5
Outlet Accessory Set for free socket					905154	Plessey 508/1/03008/205
		Fuselinks				
1FS1		MAINS 250mA anti-surge			911700	Beswick TDC 134
1FS1		MAINS 500mA anti-surge			911834	Beswick TDC 134
NOTE:		500mA fuse used when operating on 100/125V a.c. supply.				
1FS2		H.T. 1 amp anti-surge			912052	Beswick TDC 134
Fuseholders					900412	Belling Lee L575


PAN
2–3 MHz INPUT FROM LF ADAPTOR UNIT
2–3 MHz
A.G.C.
R.F. RANGE SWITCH
ANTENNA
MUTING
L.P. FILTER 0–30MHz
A.E. ATTENUATOR
W.B.
W.B.
AERIAL TUNED FILTERS
ATTENUATOR
R.F. AMP
L.P.F.
0–30 MHz
R.F.AMP.
L.P.F.
0–30 MHz
MIXER (1)
B.P.F.
40 MHz ±650KHz
1st V.F.O. BUFFER
4·5–60·5 MHz (1MHz TUNING)
1st V.F.O.
TO REMOTE TUNING DISPLAY
1st V.F.O. BUFFER
1MHz
CRYSTAL OSC.
1 MHz INPUT
1MHz AMP.
1MHz AMP.
HARMONIC GENERATOR
L.P.F.
0–32 MHz
HARMONIC MIXER
37·5MHz AMP.
1MHz OUTPUT
1MHz AMP
1 MHz
CALIBRATOR ÷10
100 KHz



Block Diagram: R A. 1217

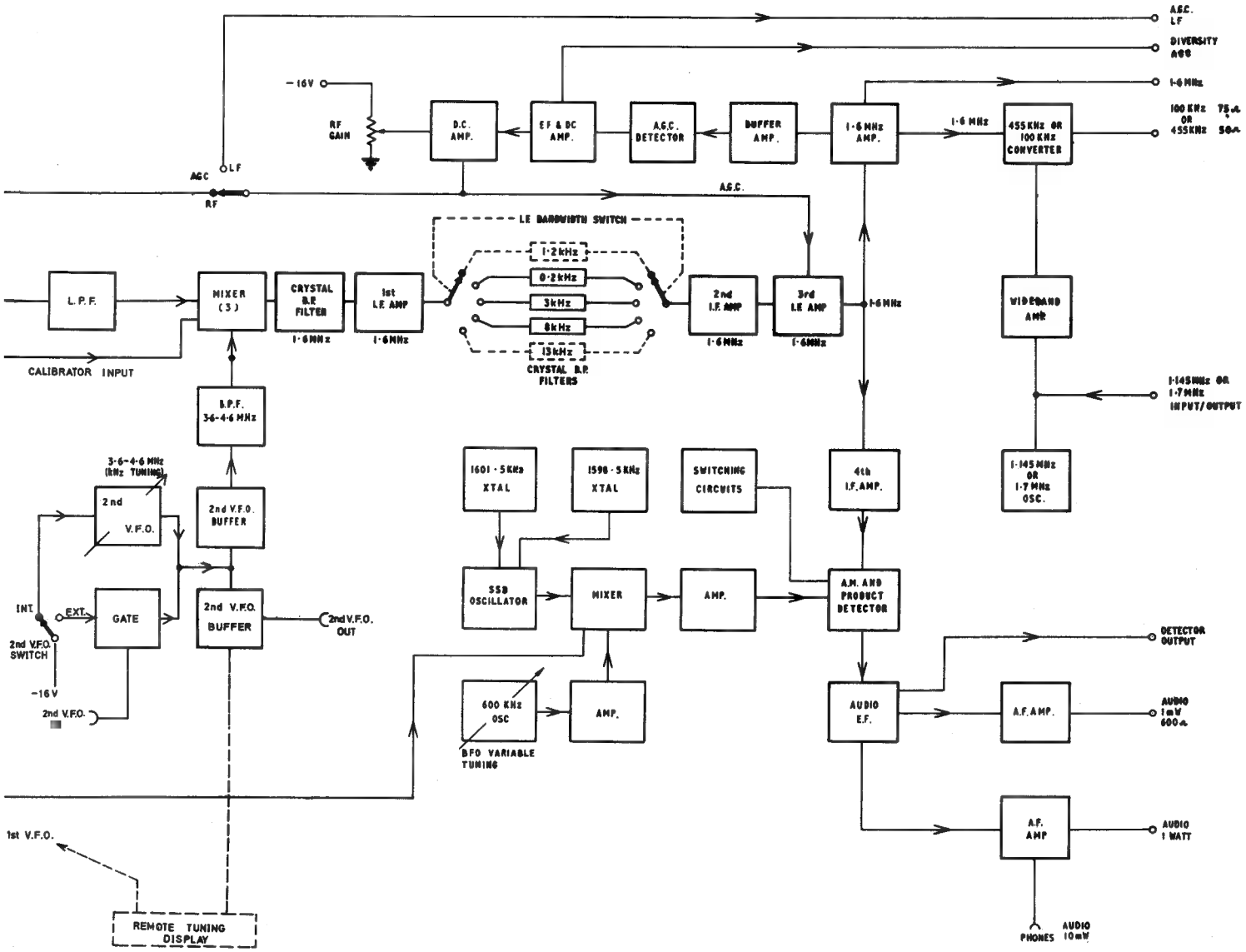
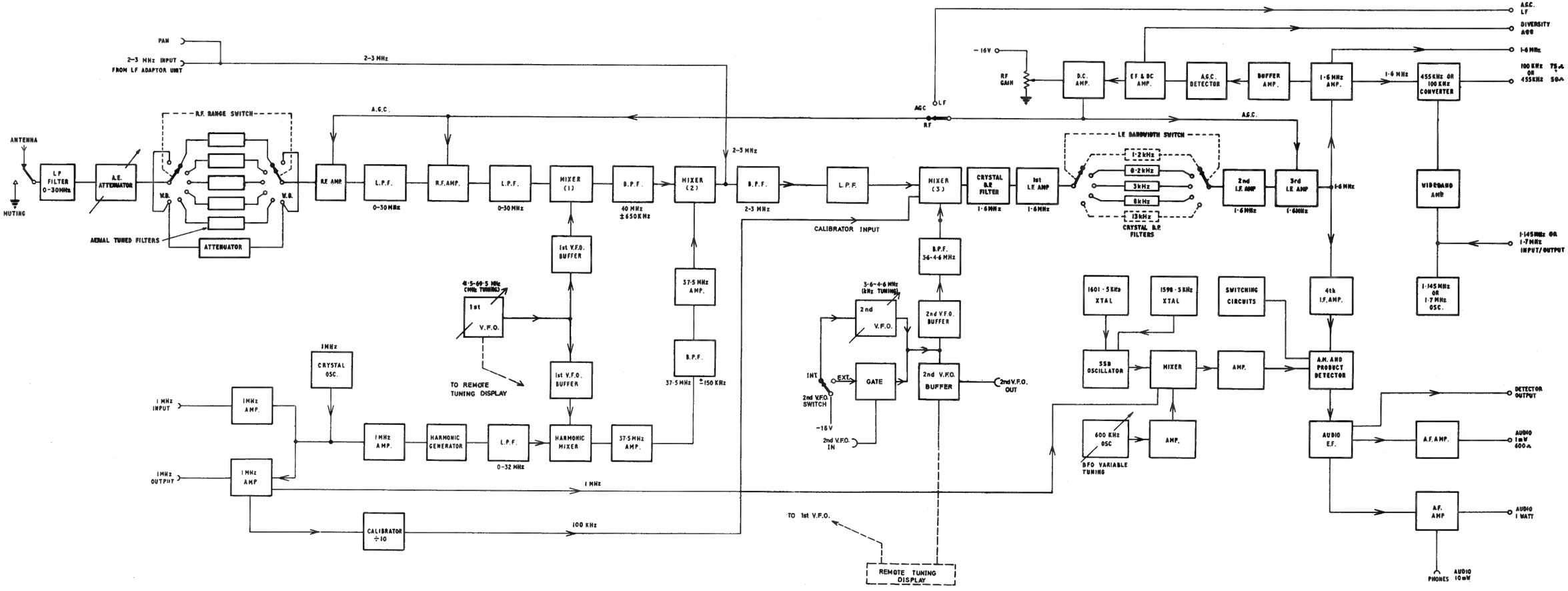


Diagram: R A. 1217

Fig.3



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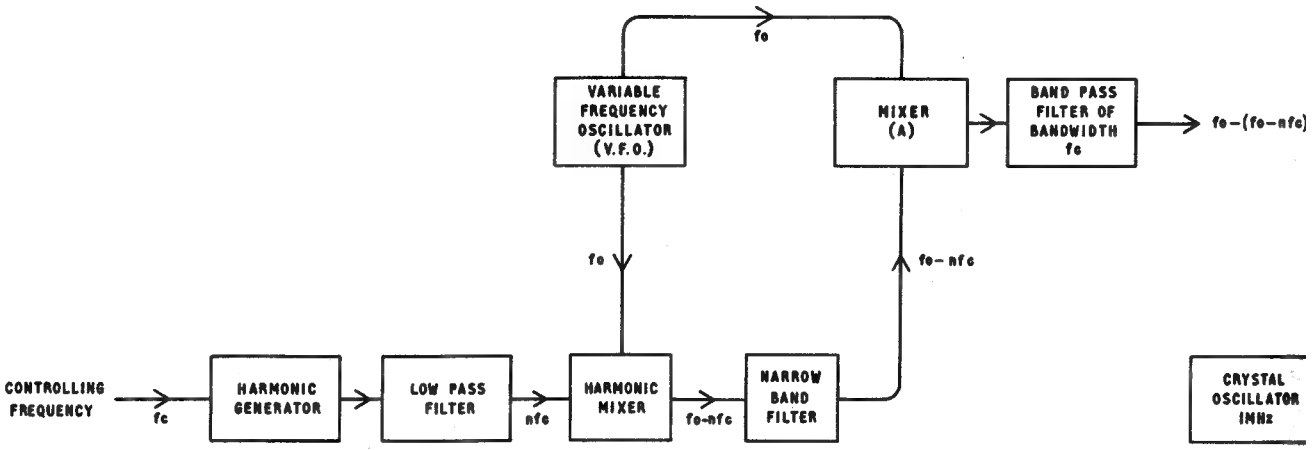
Block Diagram: R A. 1217

Fig.3

FROM
R.F.
AMPLIFIE



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Wadley System – Block Diagram Fig.1

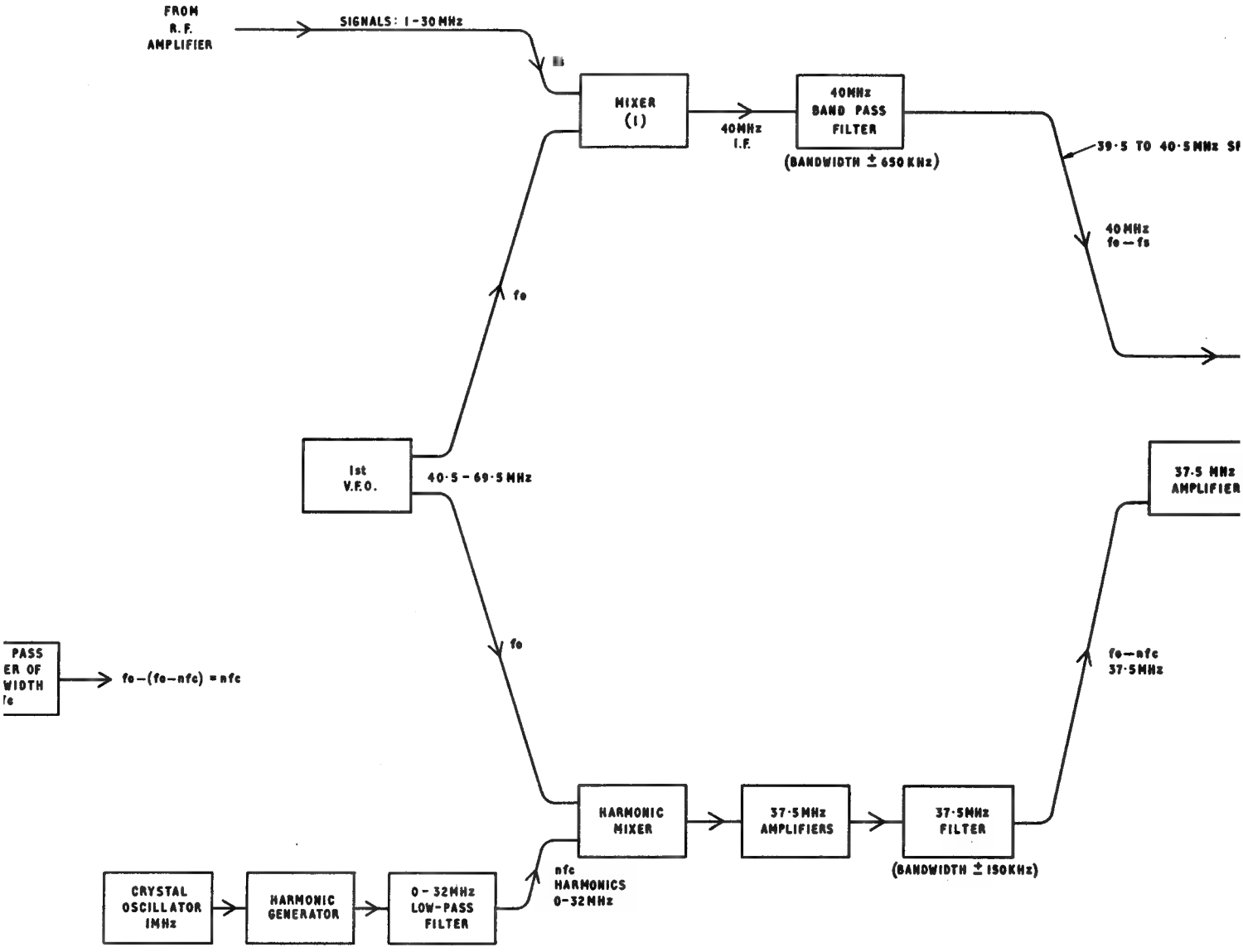
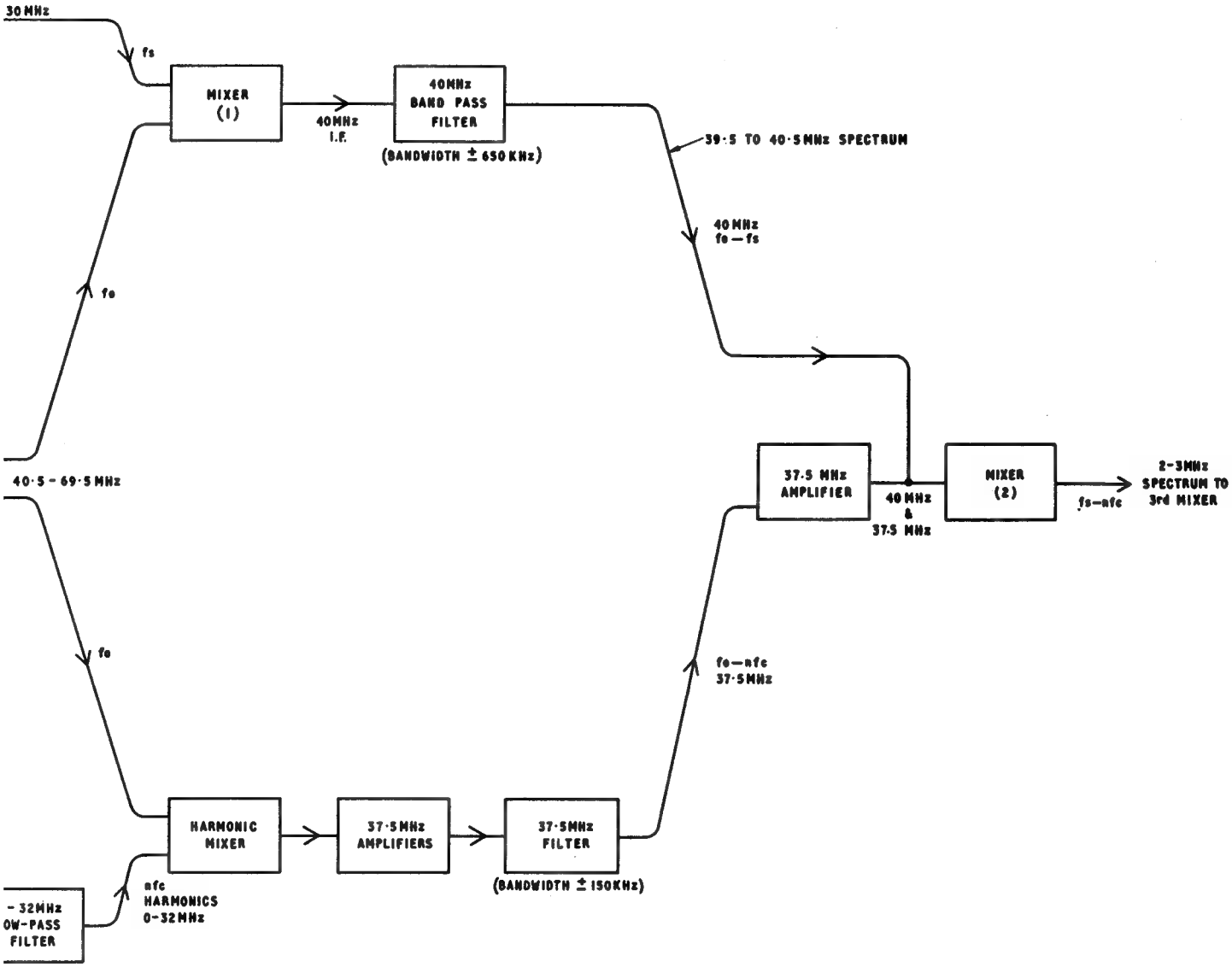
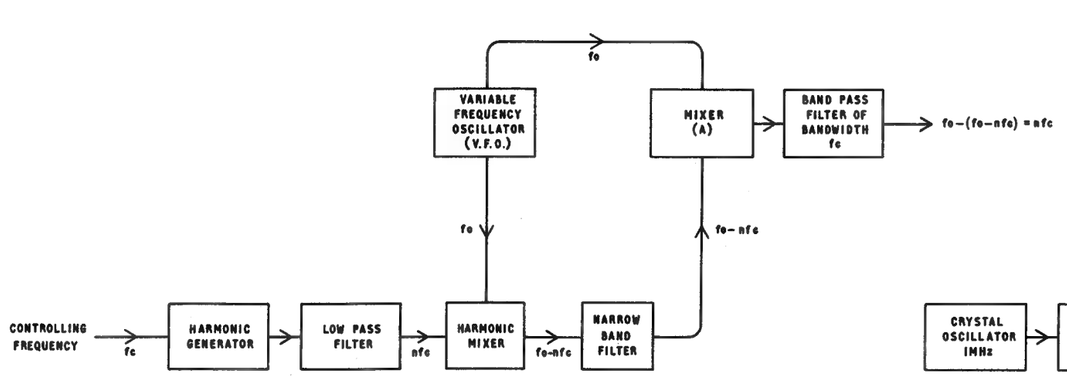


Fig.1 Electronic Band Selection — Explanatory Block Diagram



Electronic Band Selection — Explanatory Block Diagram Fig. 2



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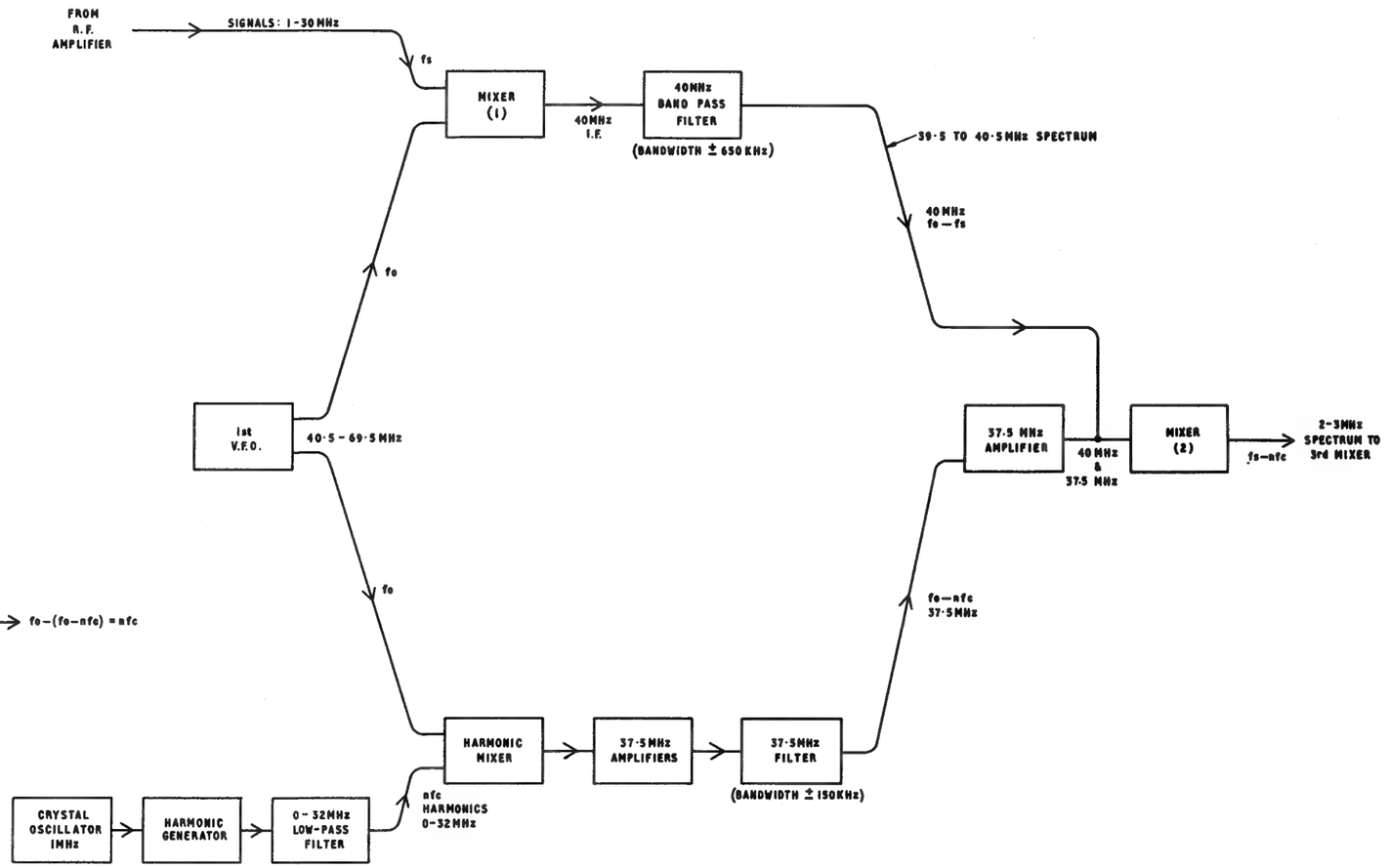
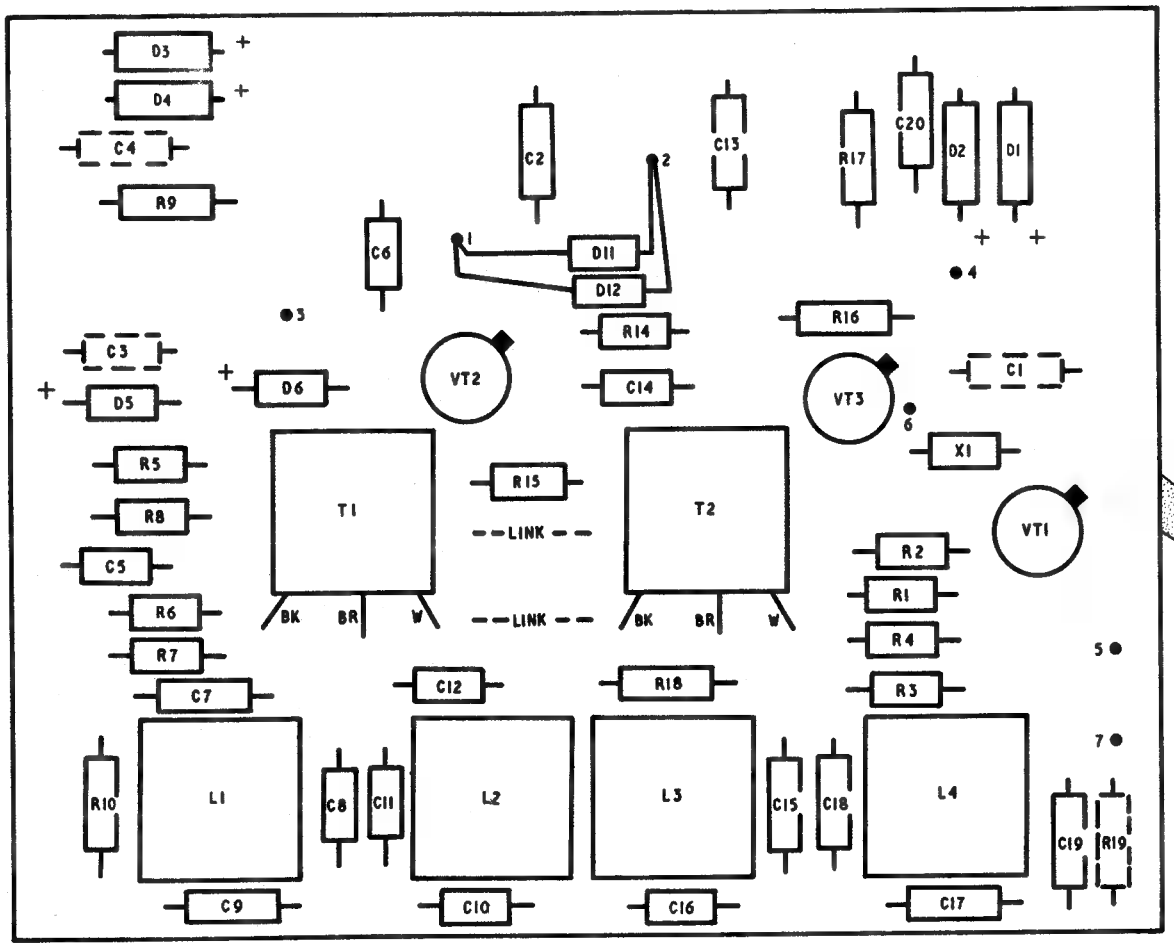
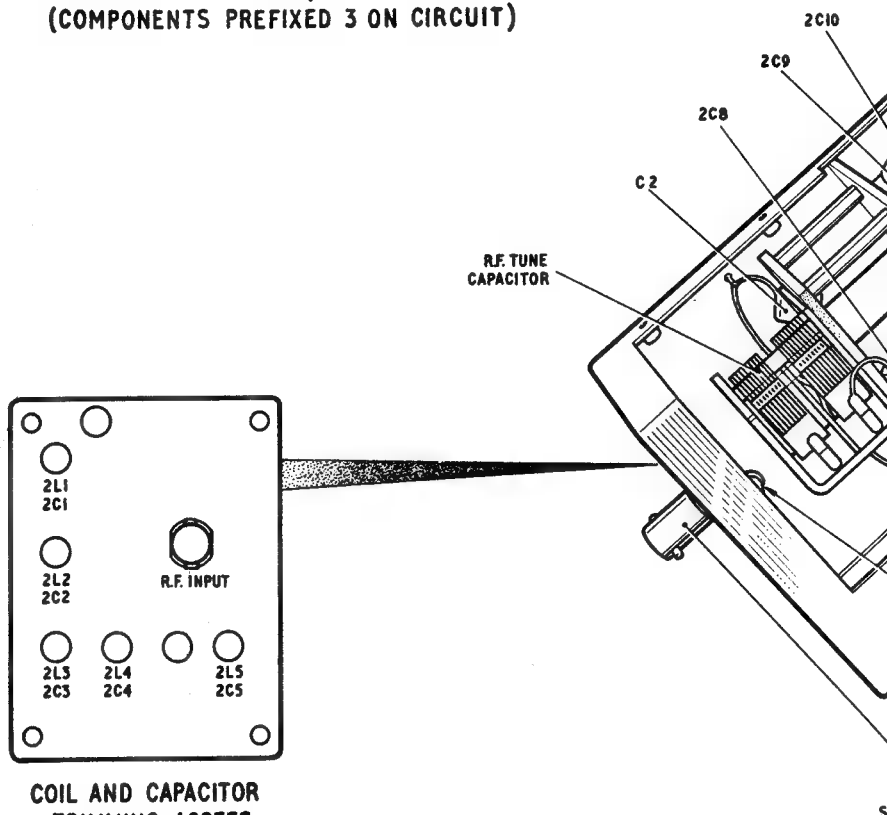
Wadley System – Block Diagram Fig.1



Electronic Band Selection – Explanatory Block Diagram Fig.2

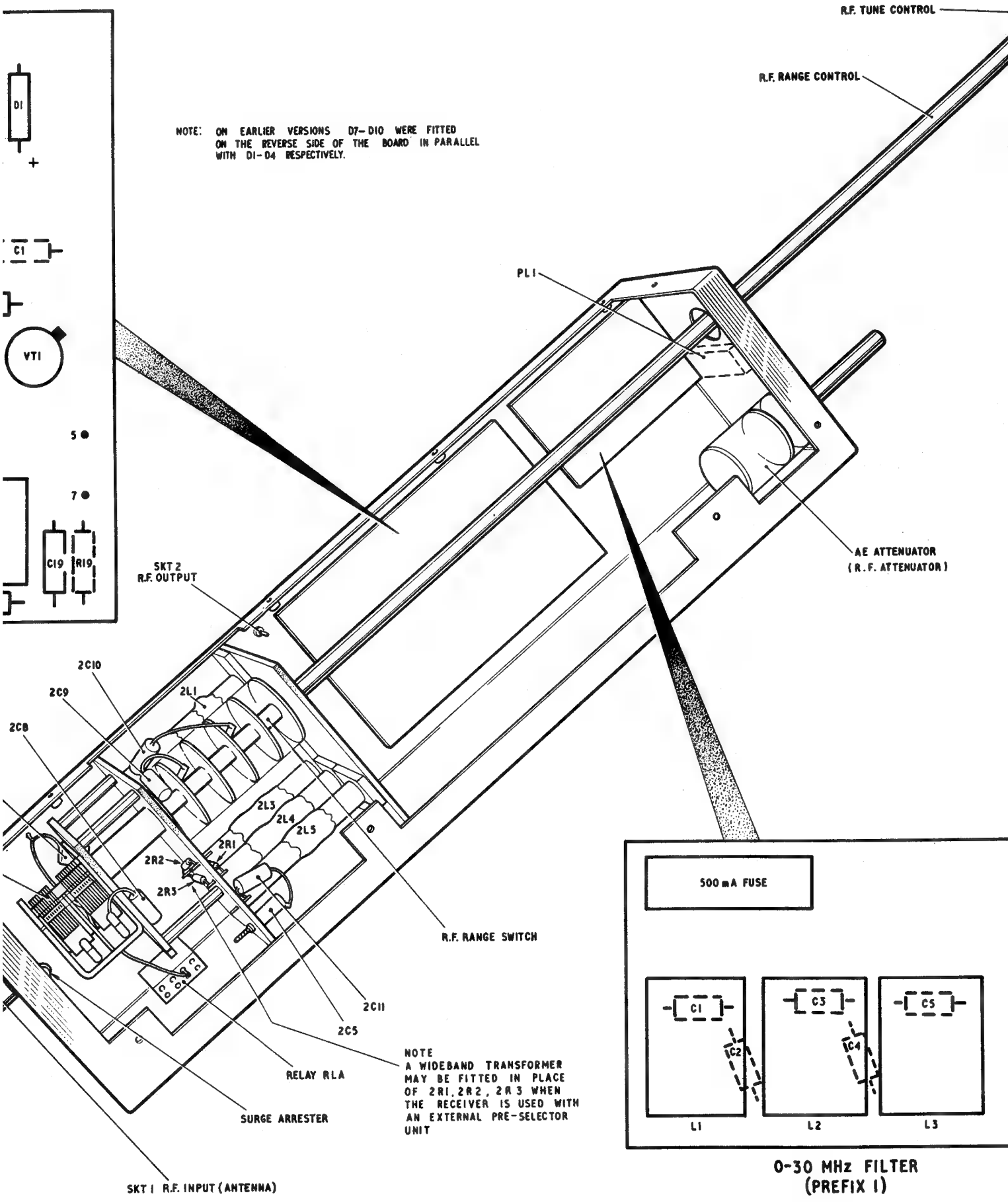


R.F. AMPLIFIER (BA 28155/B)
(COMPONENTS PREFIXED 3 ON CIRCUIT)



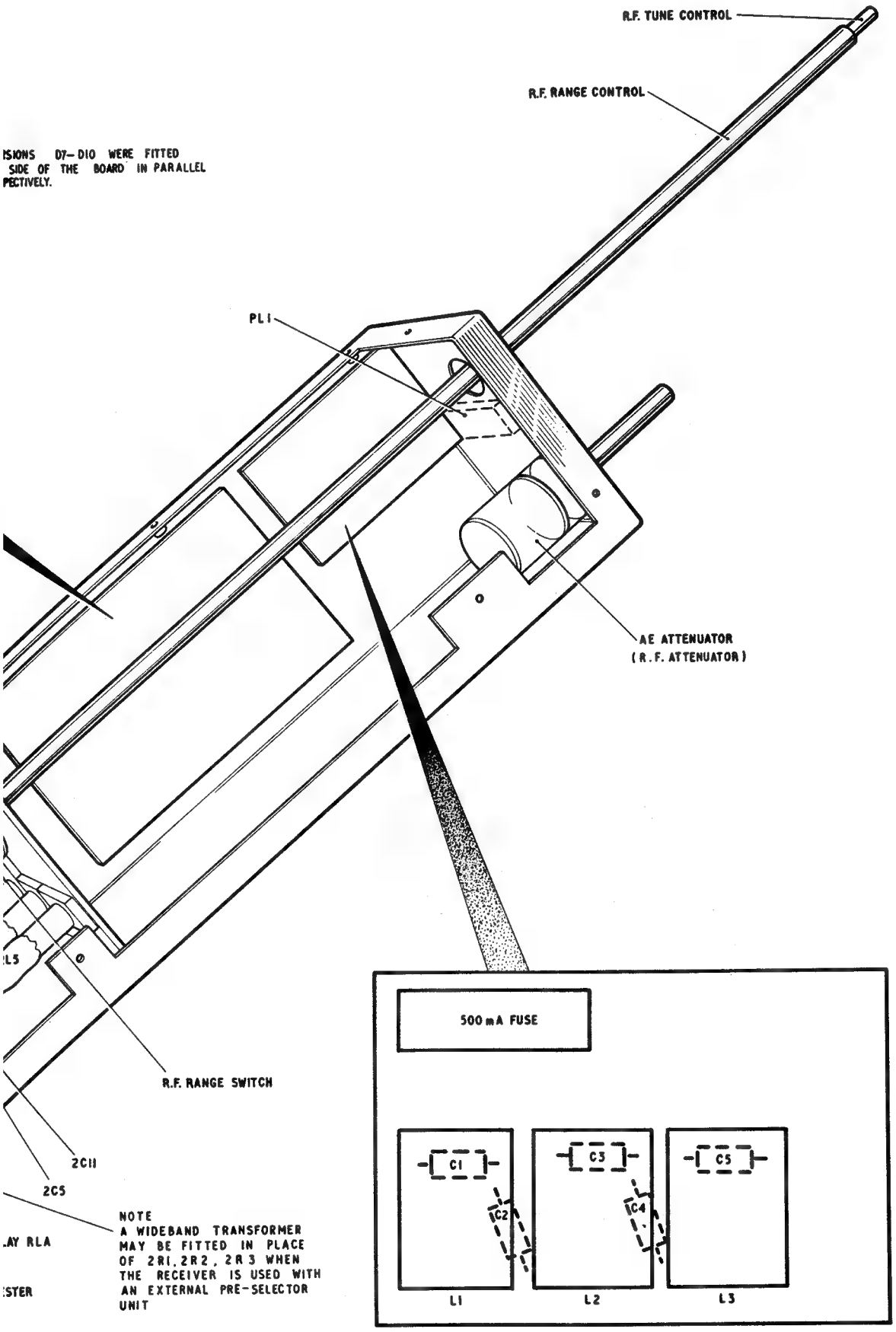
COIL AND CAPACITOR
TRIMMING ACCESS

Fig. L-4



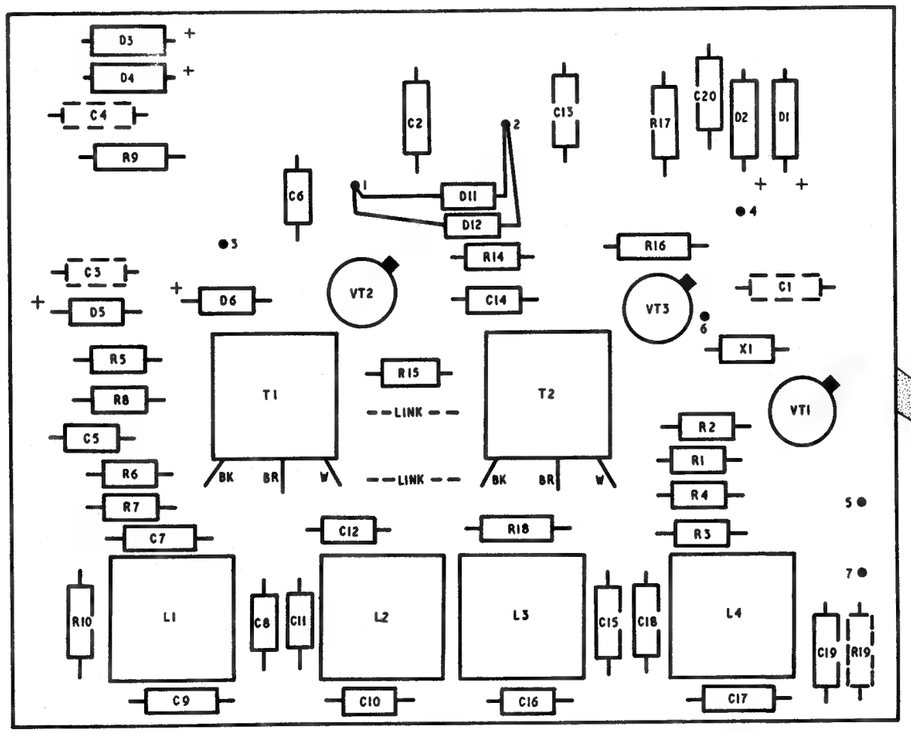
Component Layout : R.F. Module.

ISIONS D7–D10 WERE FITTED
SIDE OF THE BOARD IN PARALLEL
PECTIVELY.



0-30 MHz FILTER
(PREFIX I)

Module.



R.F. AMPLIFIER (BA 28155/B)
(COMPONENTS PREFIXED 3 ON CIRCUIT)

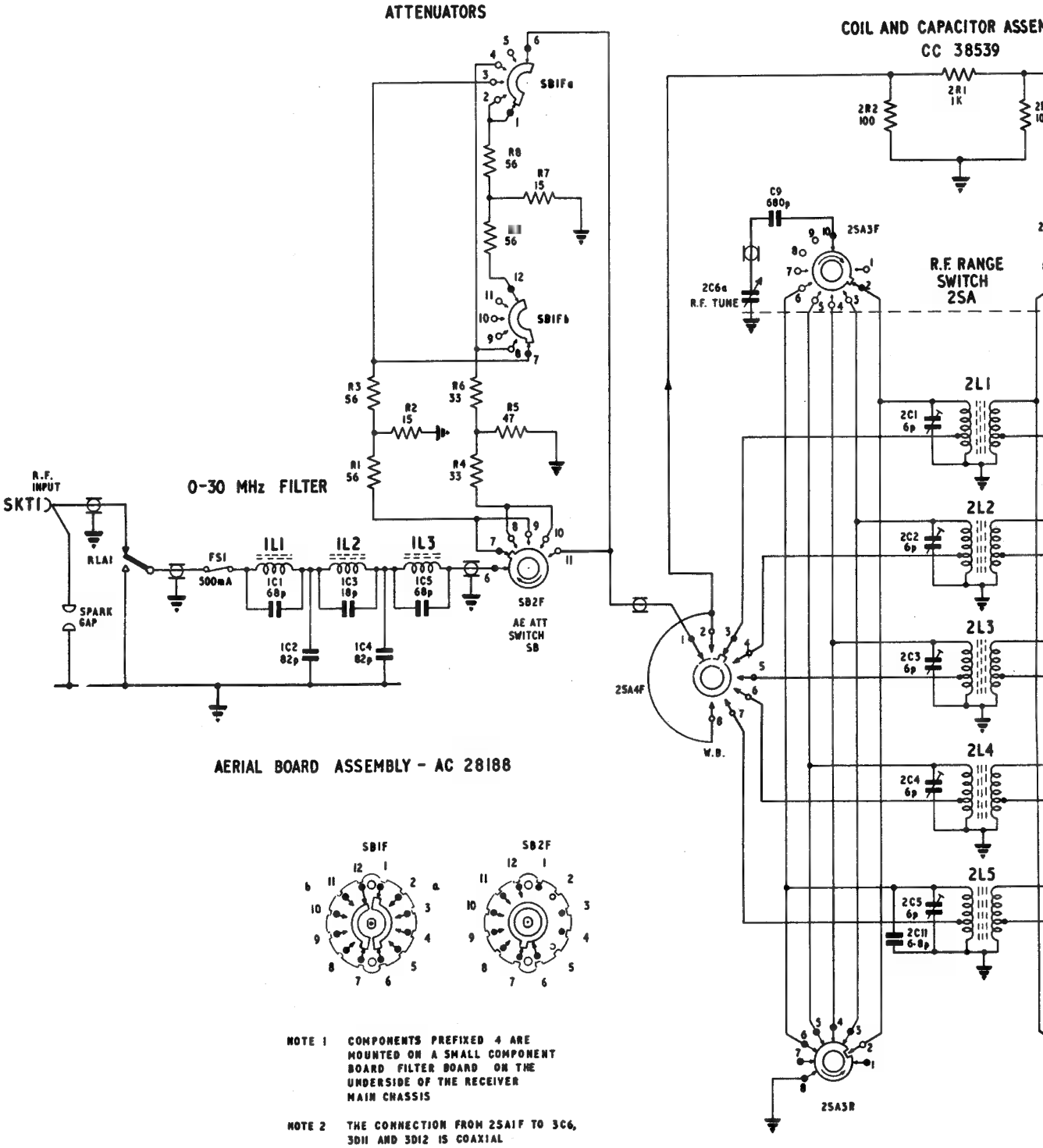
NOTE: ON EARLIER VERSIONS 07–D10 WERE FITTED ON THE REVERSE SIDE OF THE BOARD IN PARALLEL WITH D1–D4 RESPECTIVELY.

COIL AND CAPACITOR
TRIMMING ACCESS

0-30 MHz FILTER
(PREFIX 1)

Fig. L-4

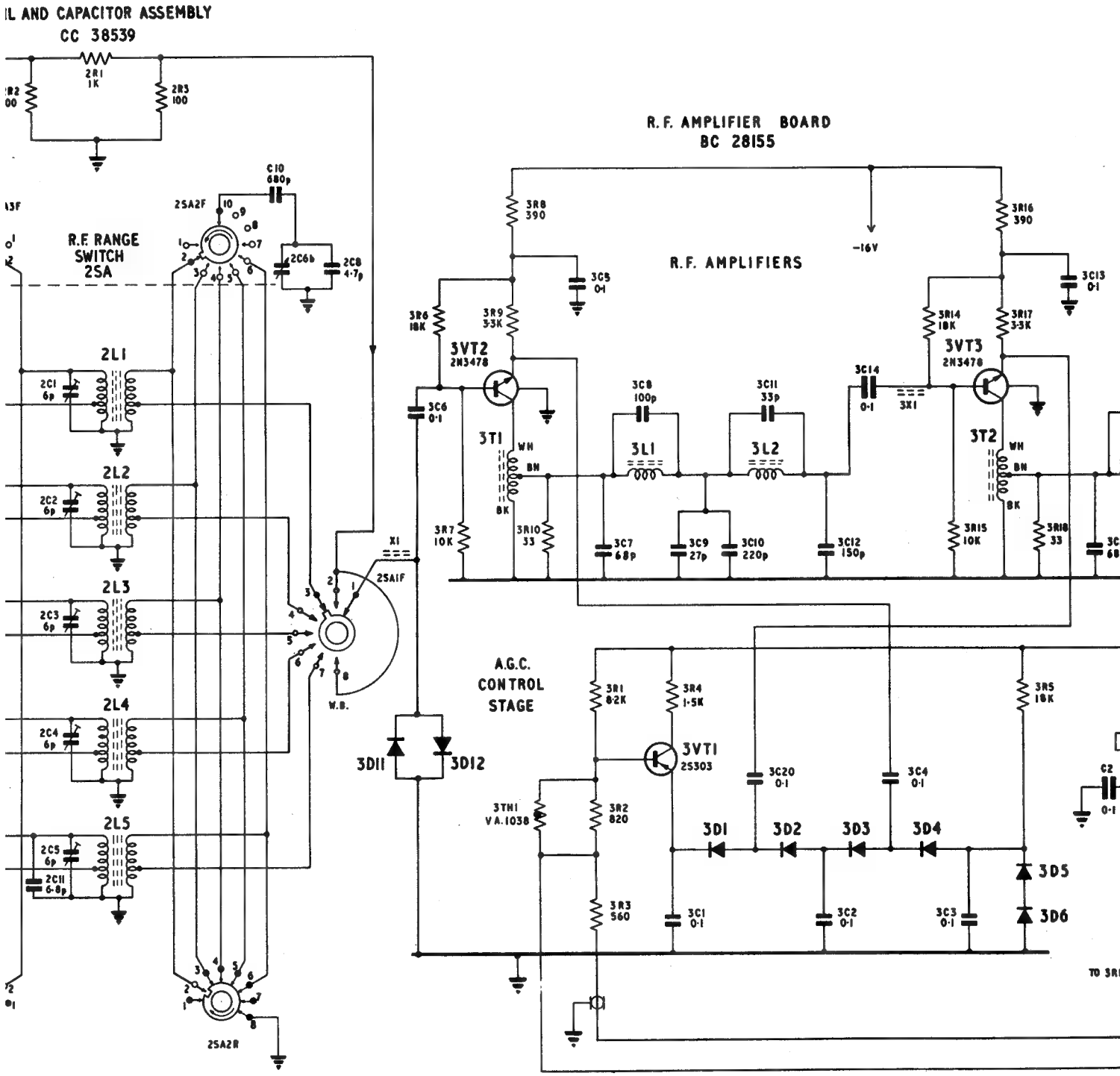
Component Layout : R.F. Module.



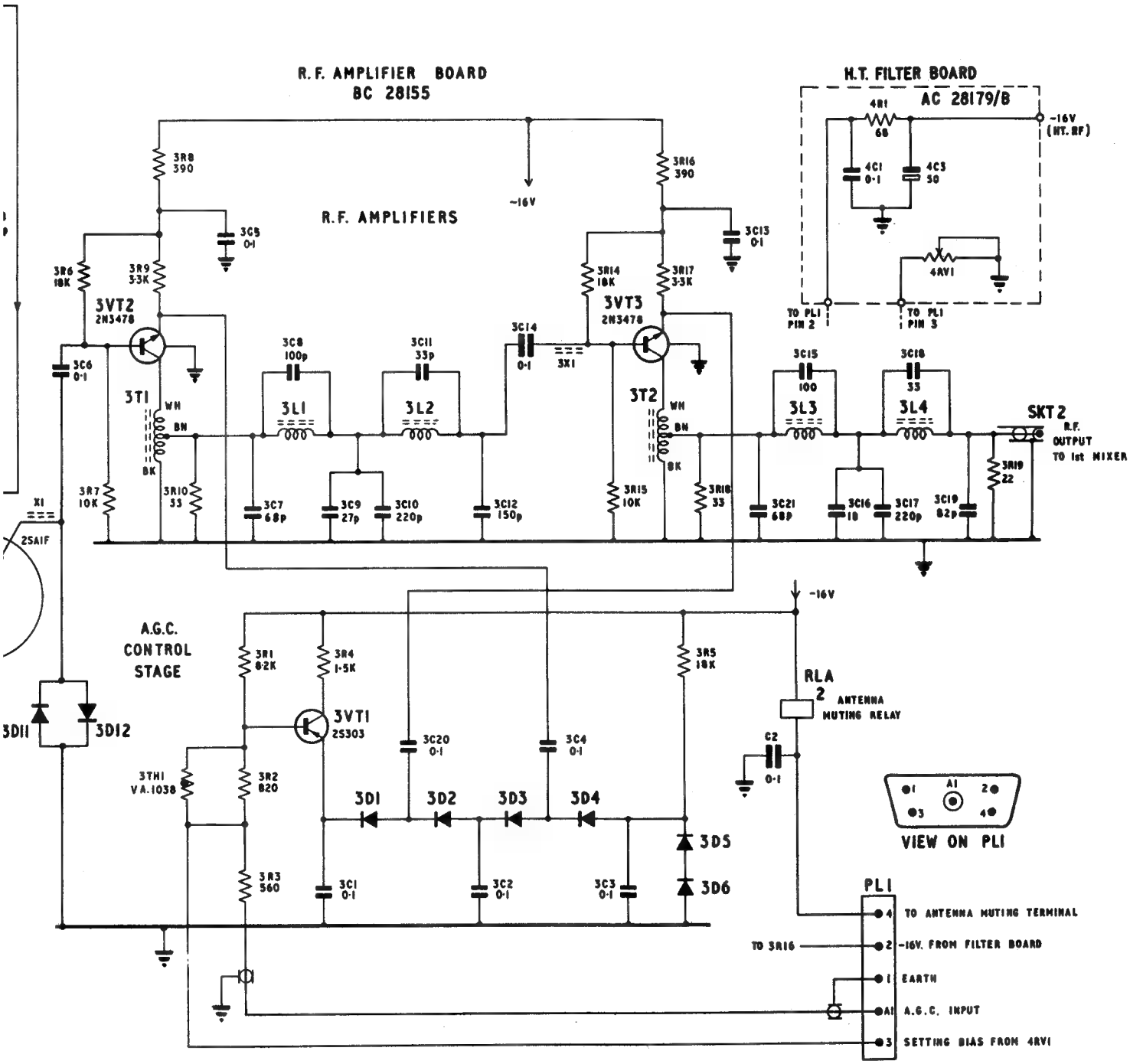
AERIAL BOARD ASSEMBLY - AC 28188

NOTE 1 COMPONENTS PREFIXED 4 ARE MOUNTED ON A SMALL COMPONENT BOARD FILTER BOARD ON THE UNDERSIDE OF THE RECEIVER MAIN CHASSIS

NOTE 2 THE CONNECTION FROM 2SA1F TO 3C6, 3D11 AND 3D12 IS COAXIAL



Circuit : R.F. Module



: R.F. Module

Fig.4

ATTENUATORS

COIL AND CAPACITOR ASSEMBLY
CC 38539

R.F. AMPLIFIER BOARD
BC 28155

H.T. FILTER BOARD
AC 28179/B

R.F. AMPLIFIERS

0-30 MHz FILTER

AERIAL BOARD ASSEMBLY - AC 28188

R.F. RANGE SWITCH 2SA

A.G.C. CONTROL STAGE

VIEW ON PLI

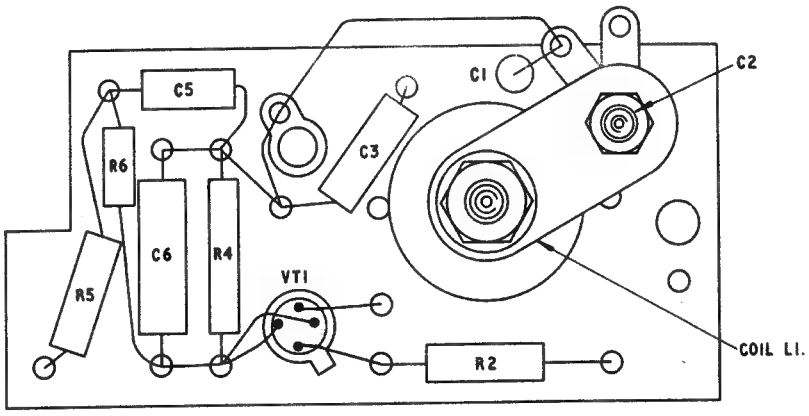
NOTE 1 COMPONENTS PREFIXED 4 ARE MOUNTED ON A SMALL COMPONENT BOARD FILTER BOARD ON THE UNDERSIDE OF THE RECEIVER MAIN CHASSIS

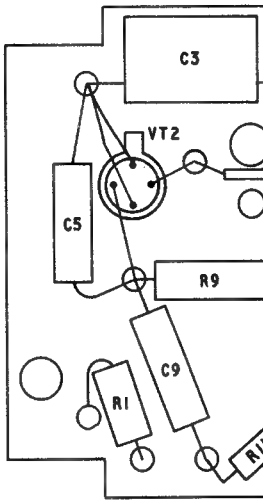
NOTE 2 THE CONNECTION FROM 2SA1F TO 3C6, 3D11 AND 3D12 IS COAXIAL

DC38538 281/4
2|4|5|6|7|10|

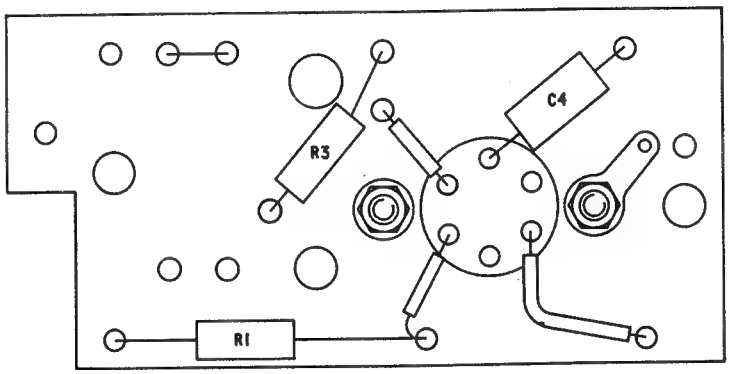
Circuit : R.F. Module

Fig.4





NOTE: THIS BO



OSCILLATOR
(BA 35195)

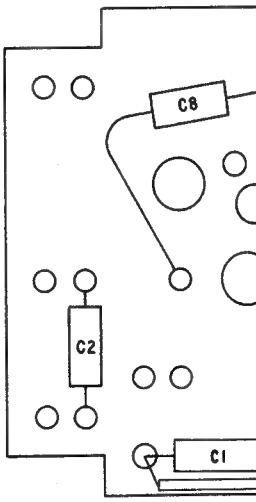
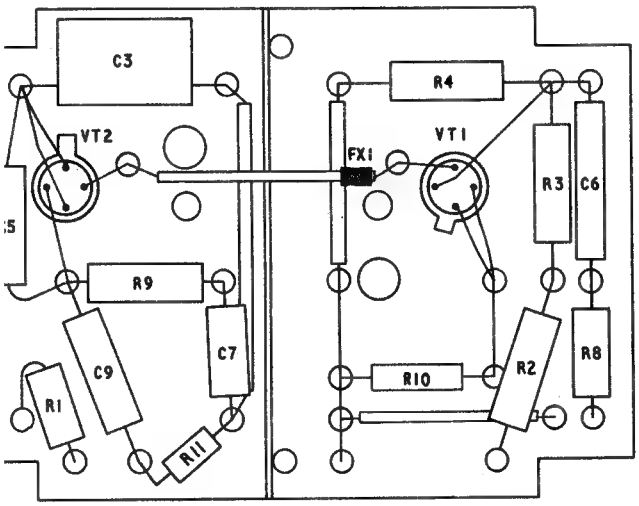
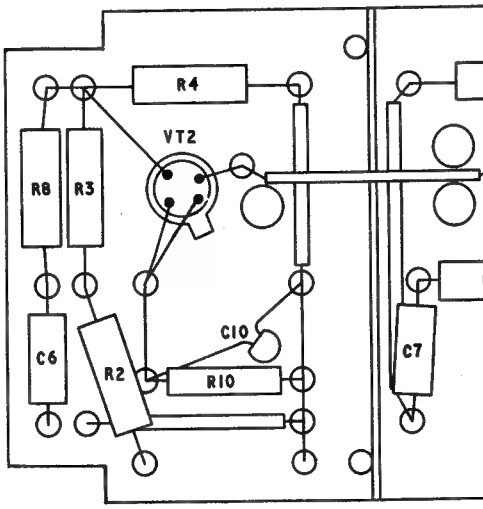


Fig. L-5

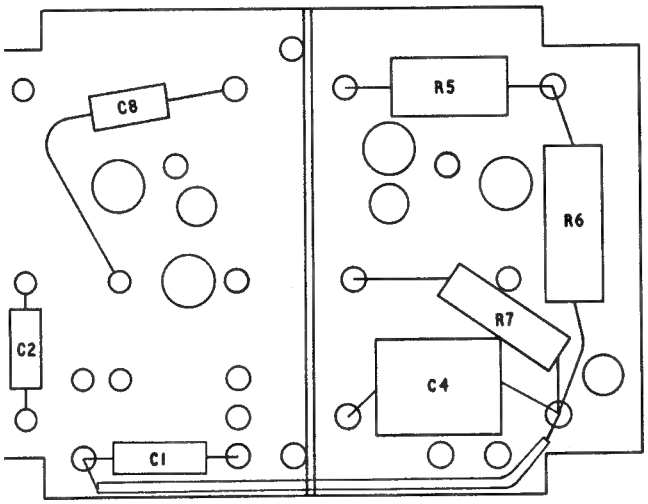
Component



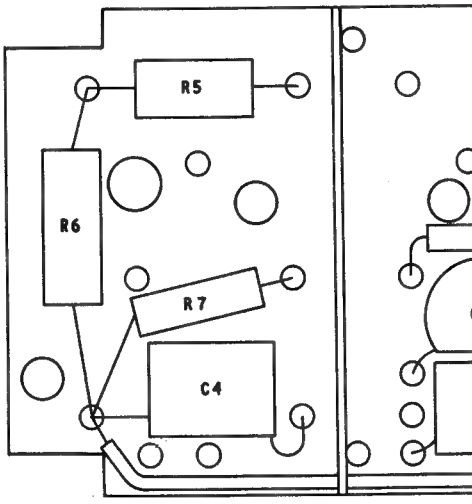
NOTE: THIS BOARD IS CONTAINED IN THE RECTANGULAR BOX



NOTE: THIS BOARD ■ ATTACHED TO THE UN
OF THE 1st. VFO CHASSIS

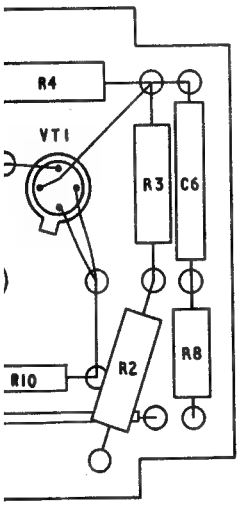


BUFFER AMPLIFIER
(BA 32535)

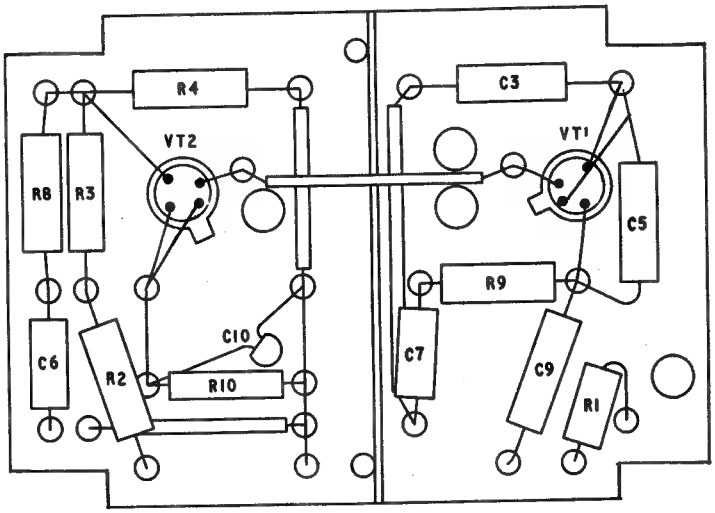


BUFFER AMPLIFIER
(BA 28128)

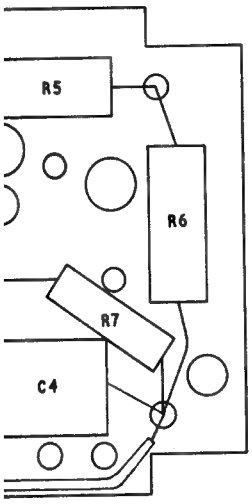
Component Layouts 1st. V.F.O.



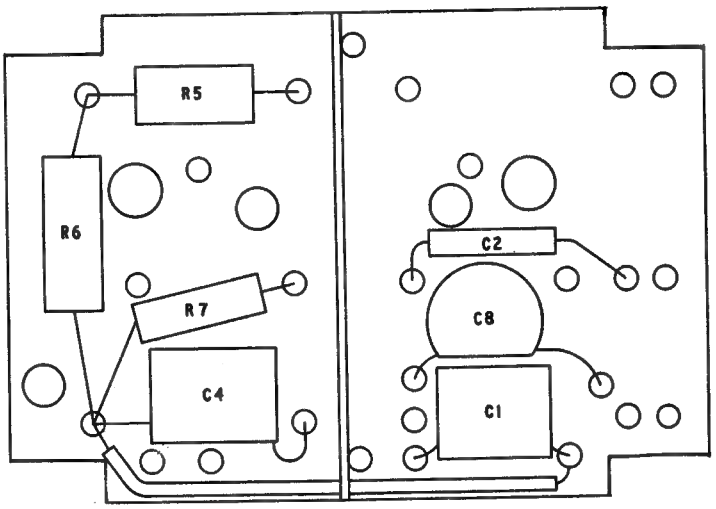
THE



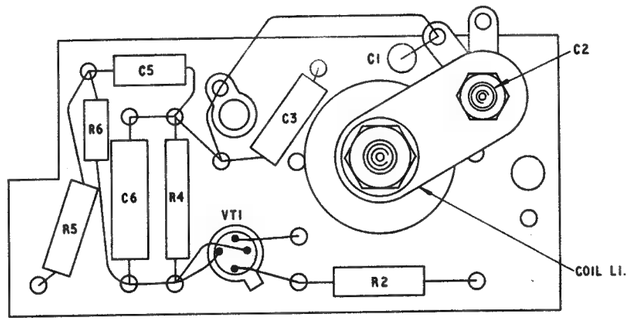
NOTE: THIS BOARD IS ATTACHED TO THE UNDERSIDE OF THE 1st. VFO CHASSIS

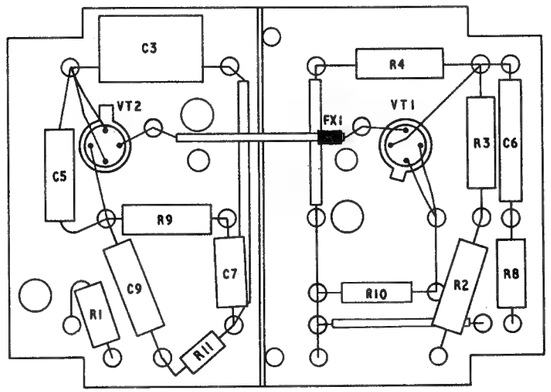


IER

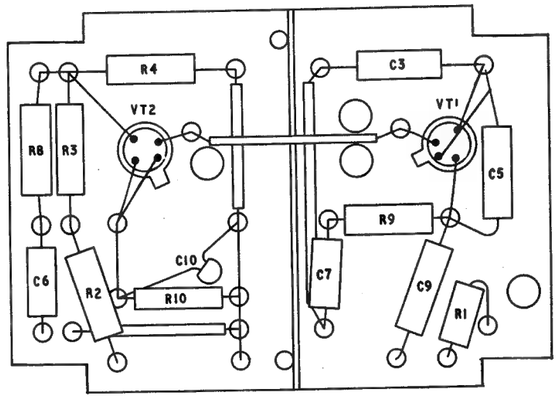


BUFFER AMPLIFIER
(BA 28128)

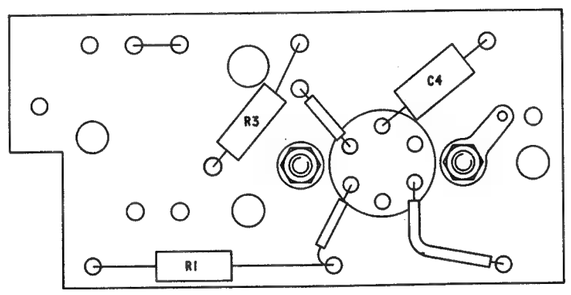




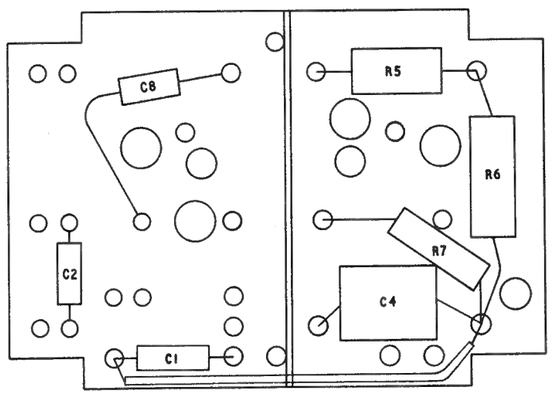
NOTE: THIS BOARD IS CONTAINED IN THE RECTANGULAR BOX



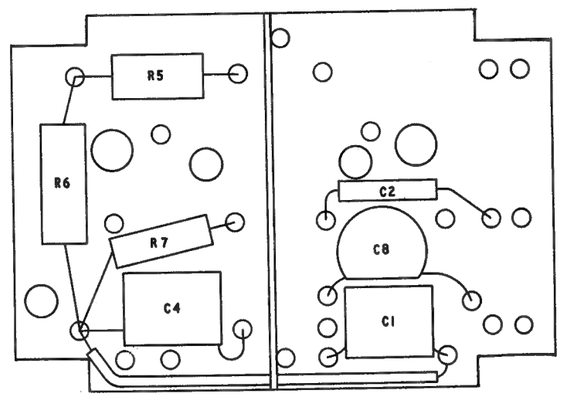
NOTE: THIS BOARD IS ATTACHED TO THE UNDERSIDE OF THE 1st. VFO CHASSIS



OSCILLATOR
(BA 35195)



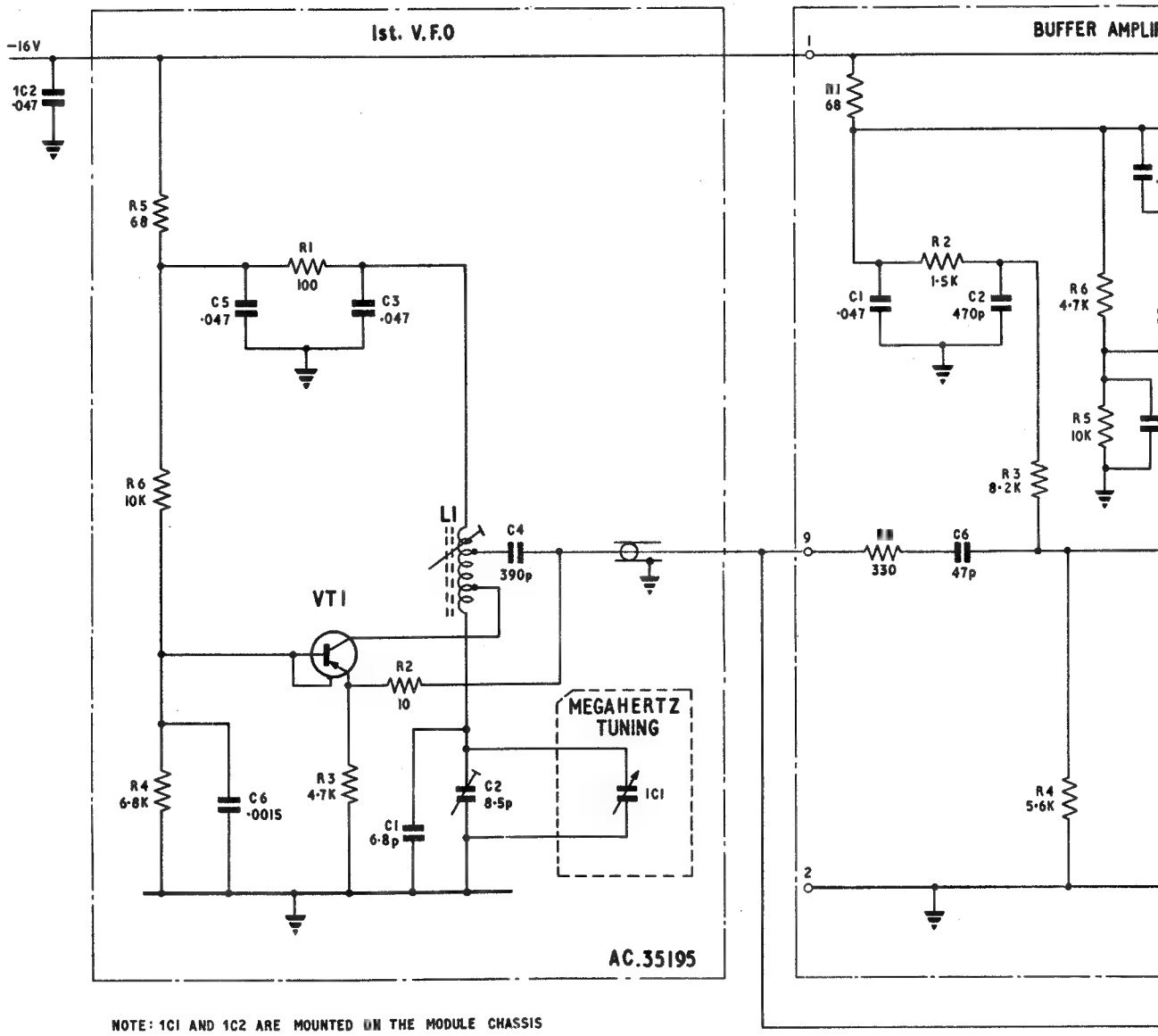
BUFFER AMPLIFIER
(BA 32535)



BUFFER AMPLIFIER
(BA 28128)

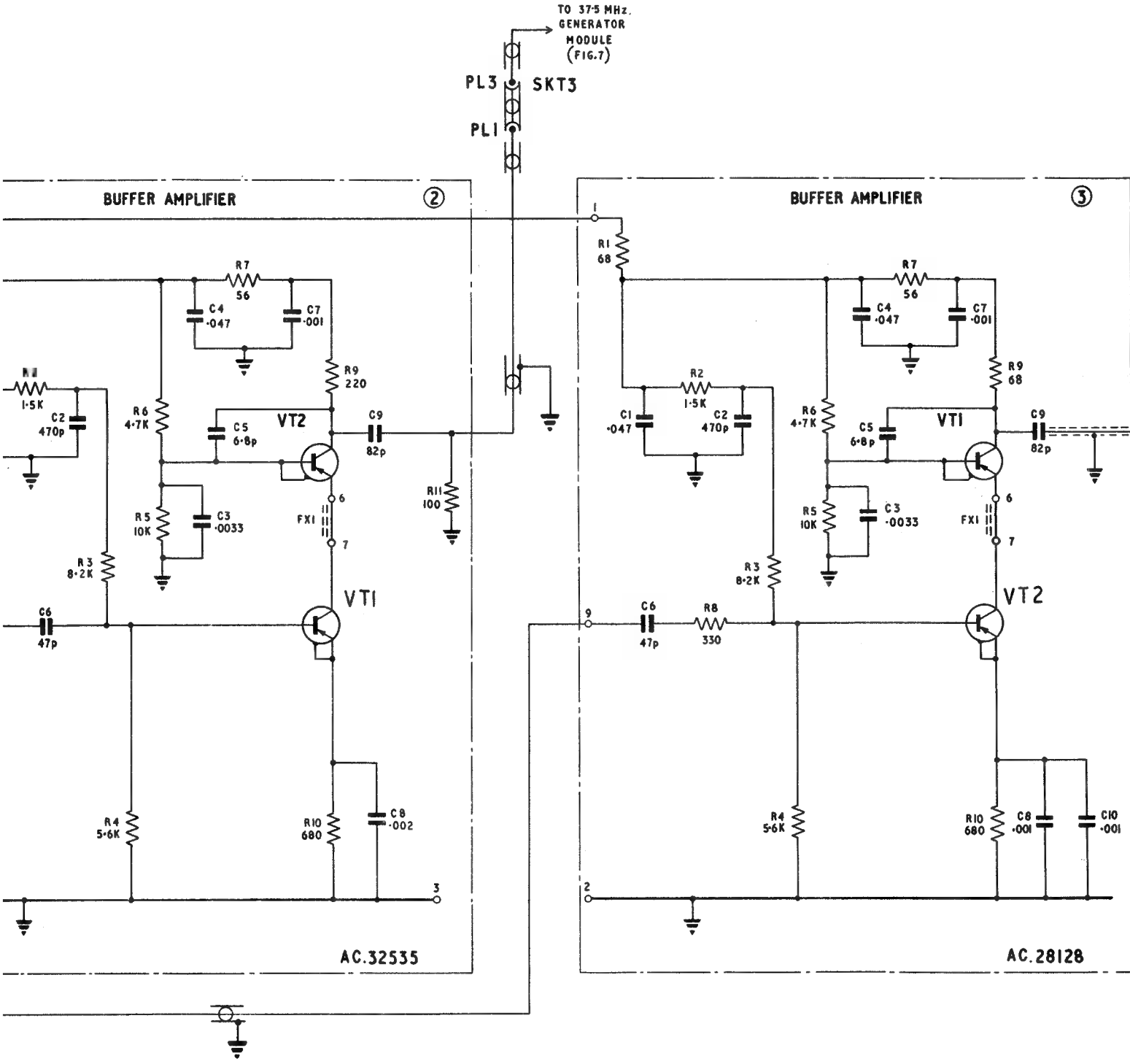
Fig. L-5

Component Layouts 1st. V.F.O.

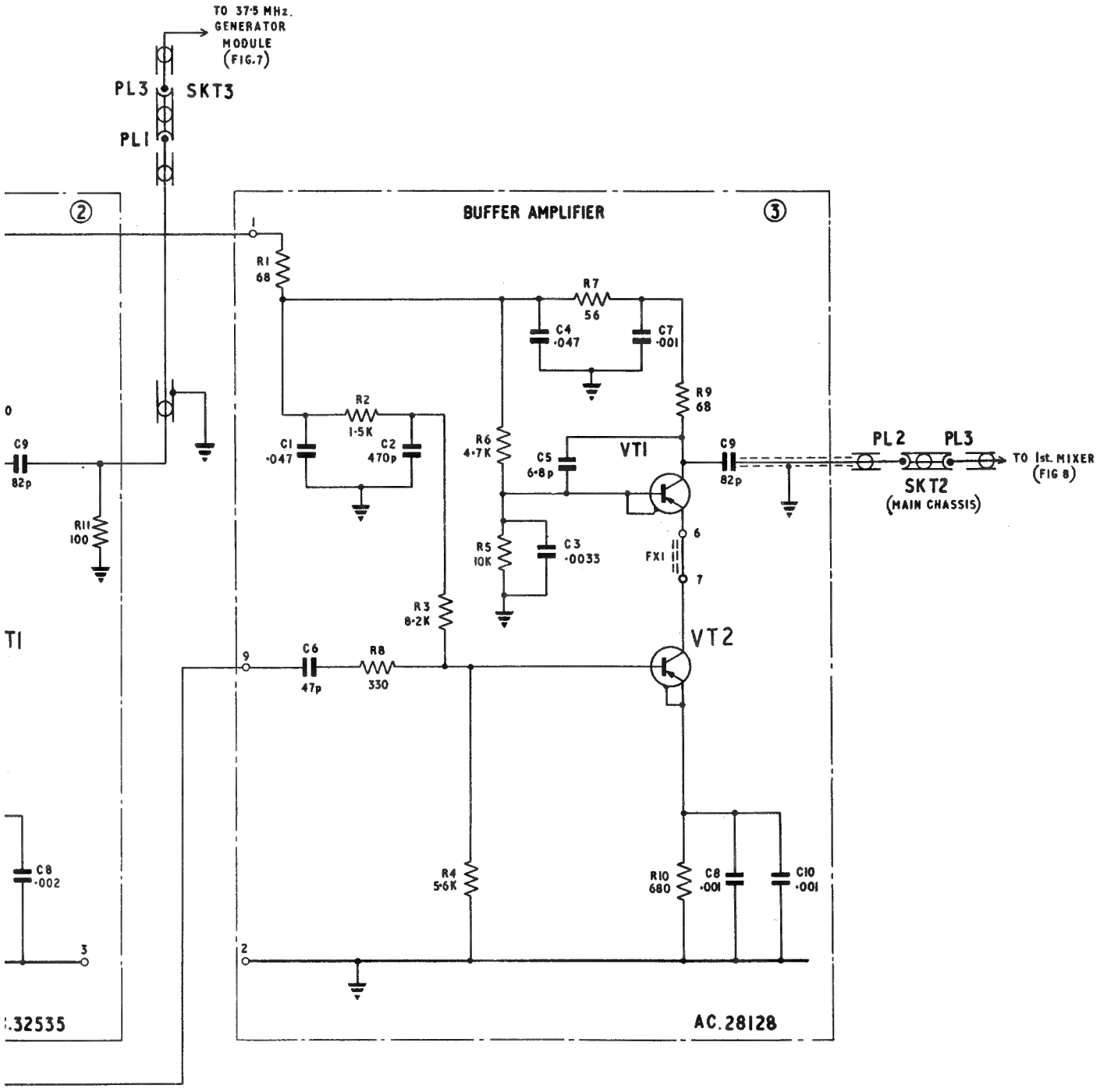


NOTE: 1C1 AND 1C2 ARE MOUNTED ON THE MODULE CHASSIS

BC28120						281/5			
4	7	8	9	10	11	12	13	15	16

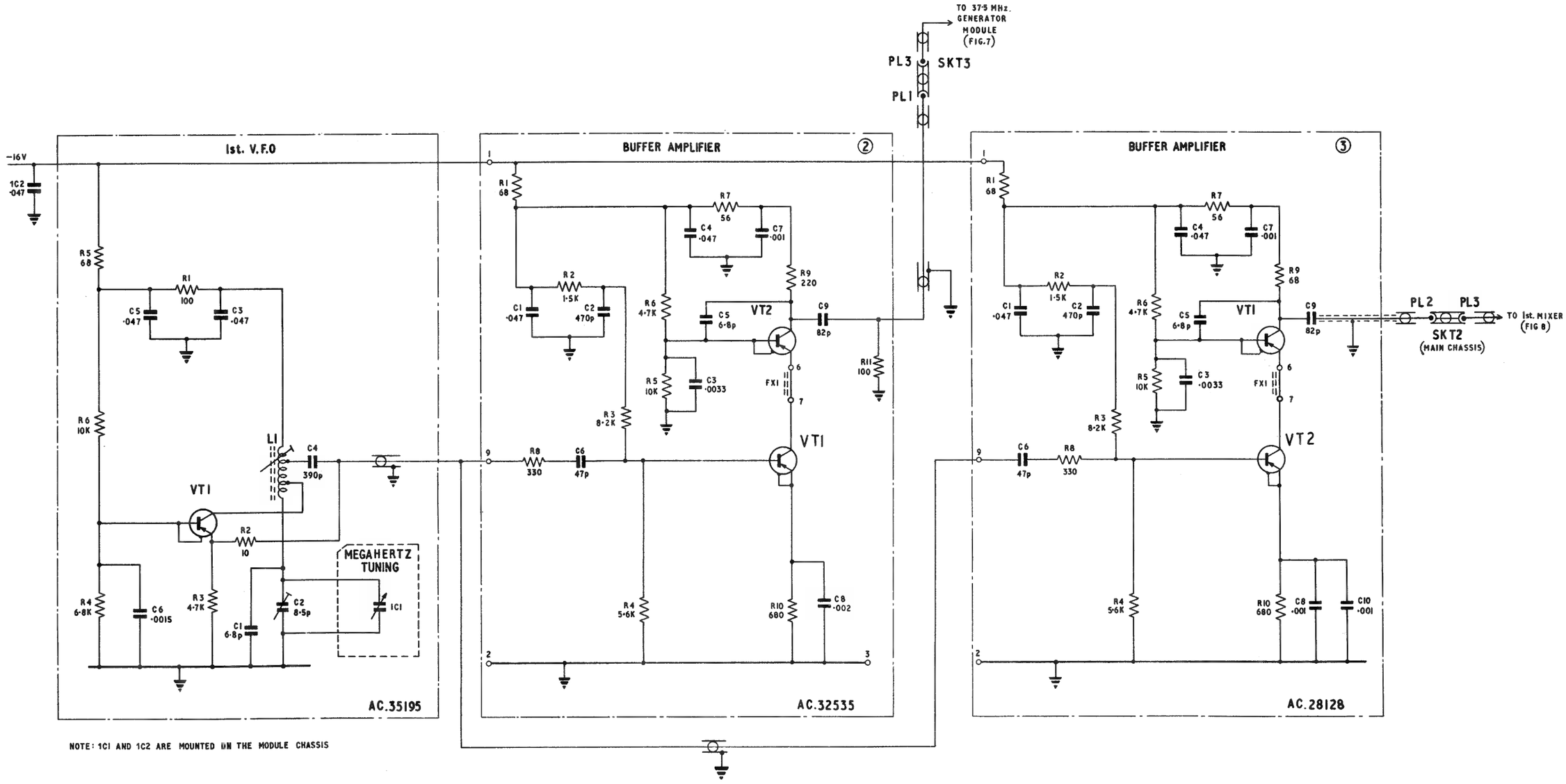


Circuit: Ist. V. F. O


TO 37·5 MHz. GENERATOR MODULE (FIG.7)
PL3
SKT3
PL1
BUFFER AMPLIFIER
R1 68
R7 56
C4 ·047
C7 ·001
R9 68
R2 1·5K
C1 ·047
C2 470p
R6 4·7K
C5 6·8p
VT1
C9 82p
PL2
PL3
TO 1st. MIXER (FIG 8)
SKT2 (MAIN CHASSIS)
R11 100
R5 10K
C3 ·0033
FX1
R3 8·2K
VT2
C6 47p
R8 330
R4 5·6K
R10 680
C8 ·001
C10 ·001
C8 ·002
AC.28128

1st. V. F. O

Fig. 5

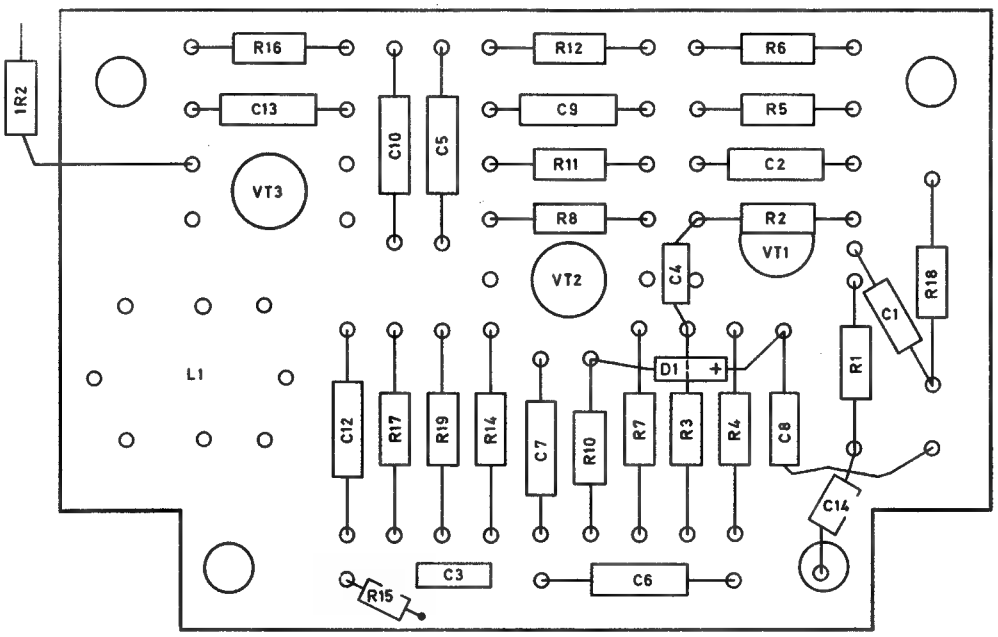


NOTE: 1C1 AND 1C2 ARE MOUNTED ON THE MODULE CHASSIS

BC28120	281/5
4 7 8 9 10 11 12 13 15 16	

Circuit: 1st. V. F. O

Fig. 5



(REAR OF BOARD)
1 MHz AMPLIFIERS
(BA32858)

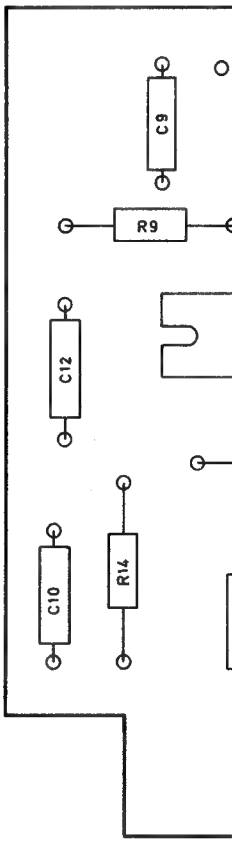
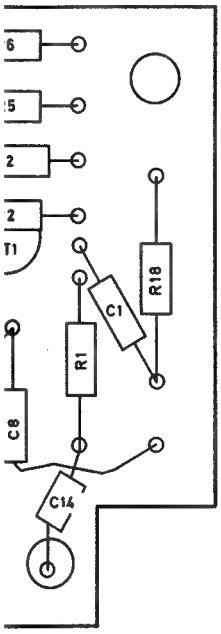
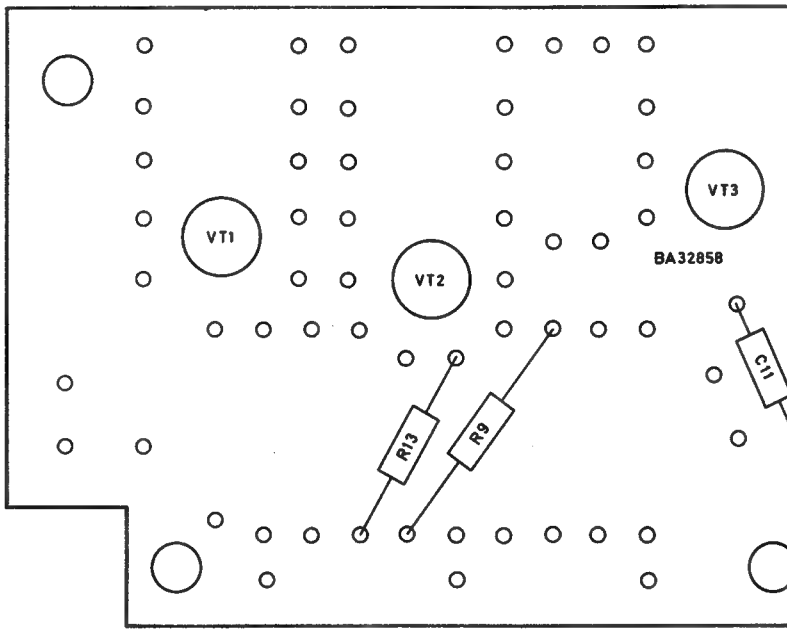


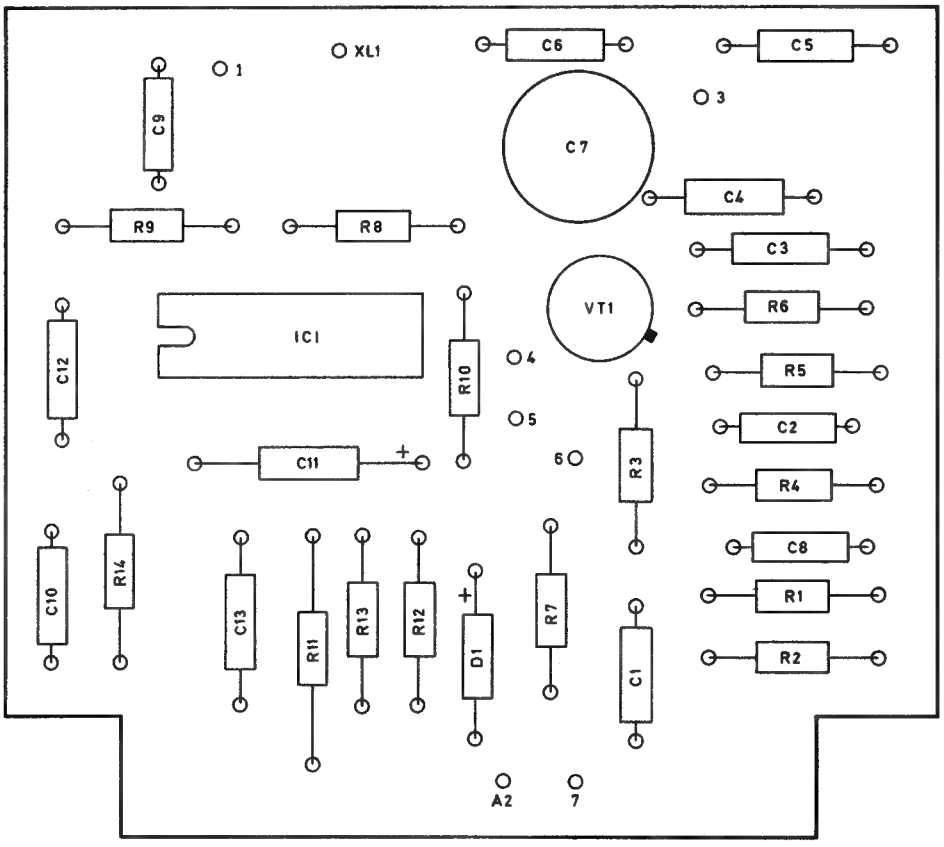
Fig. L-6

Layout : 1MHz





(FRONT OF BOARD)
1MHz AMPLIFIERS
(BA32858)

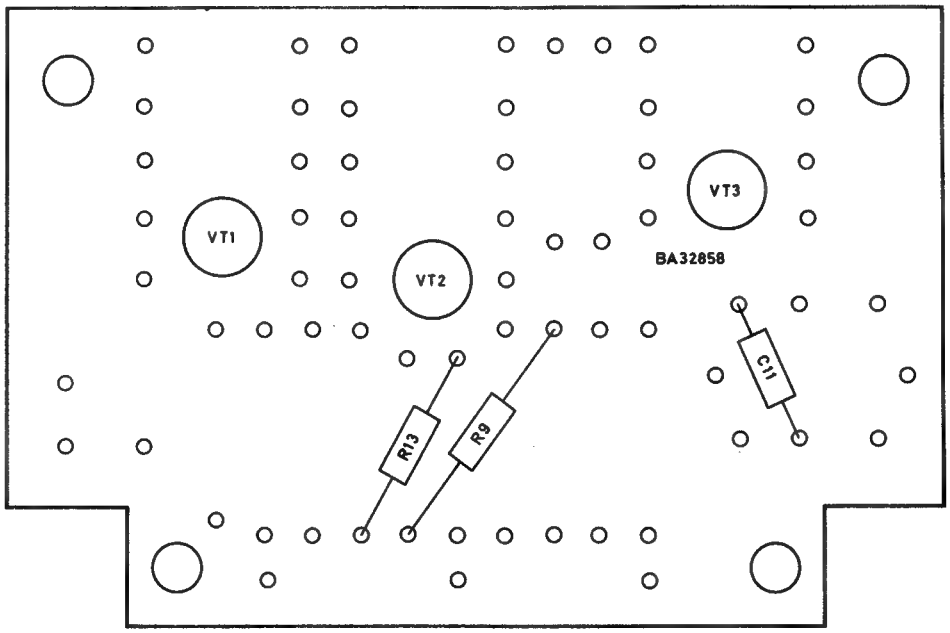


1MHz OSCILLATOR AND CALIBRATOR
(BA41745)

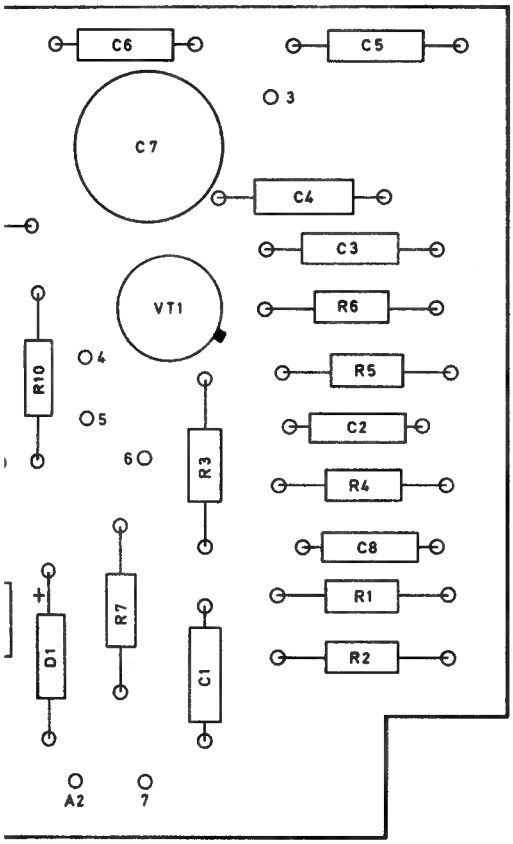
NOTE. 1. ■ THE RA.1218 AND RA.1219 RECEIVERS THE OSCILLATOR SECTION IS NOT USED AND THE CRYSTAL XL1 IS REMOVED

NOTE. 2. ON EARLIER VERSIONS CALIBRATOR BOARD BA32860 WAS FITTED

Layout : 1MHz Amplifier Oscillator and Calibrator



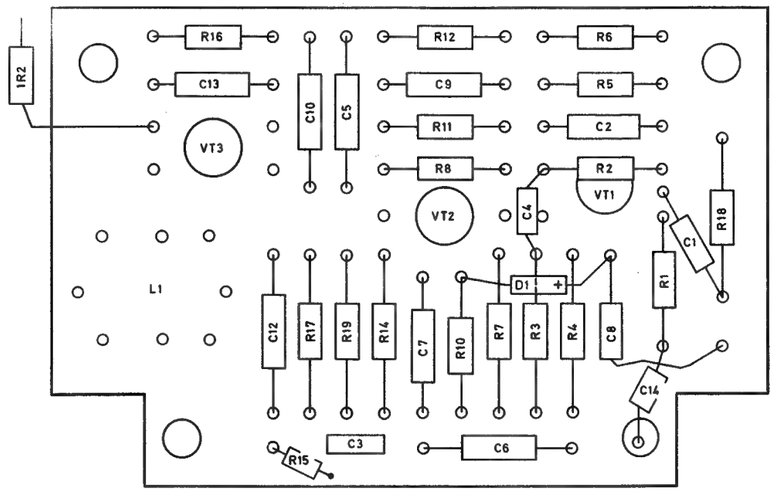
(FRONT OF BOARD)
1 MHz AMPLIFIERS
(BA32858)



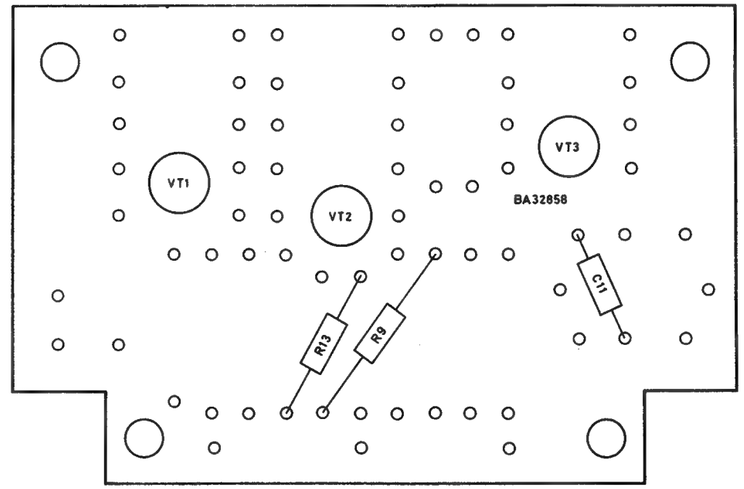
NOTE. 1. IN THE RA.1218 AND RA.1219 RECEIVERS THE OSCILLATOR SECTION IS NOT USED AND THE CRYSTAL XL1 IS REMOVED

NOTE. 2. ON EARLIER VERSIONS CALIBRATOR BOARD BA32860 WAS FITTED

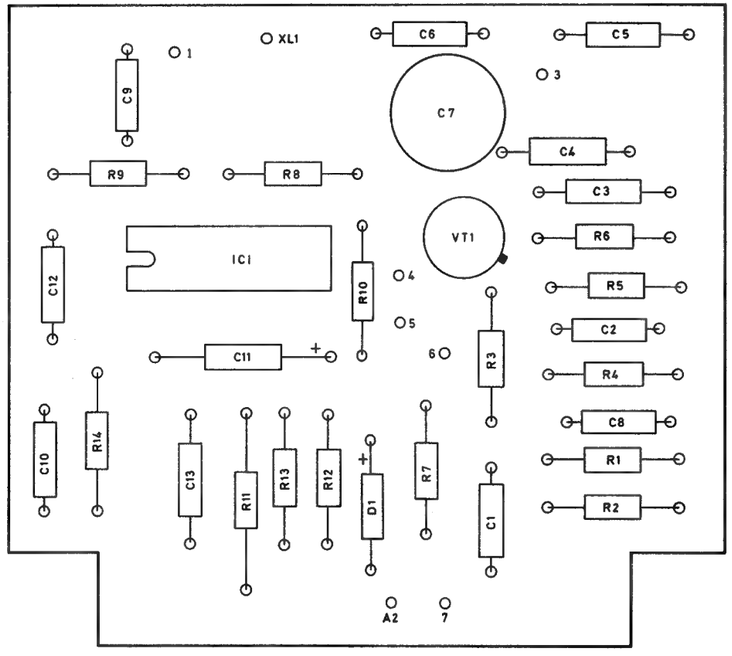
ATOR AND CALIBRATOR
A41745)



(REAR OF BOARD)
1 MHz AMPLIFIERS
(BA32858)



(FRONT OF BOARD)
1 MHz AMPLIFIERS
(BA32858)



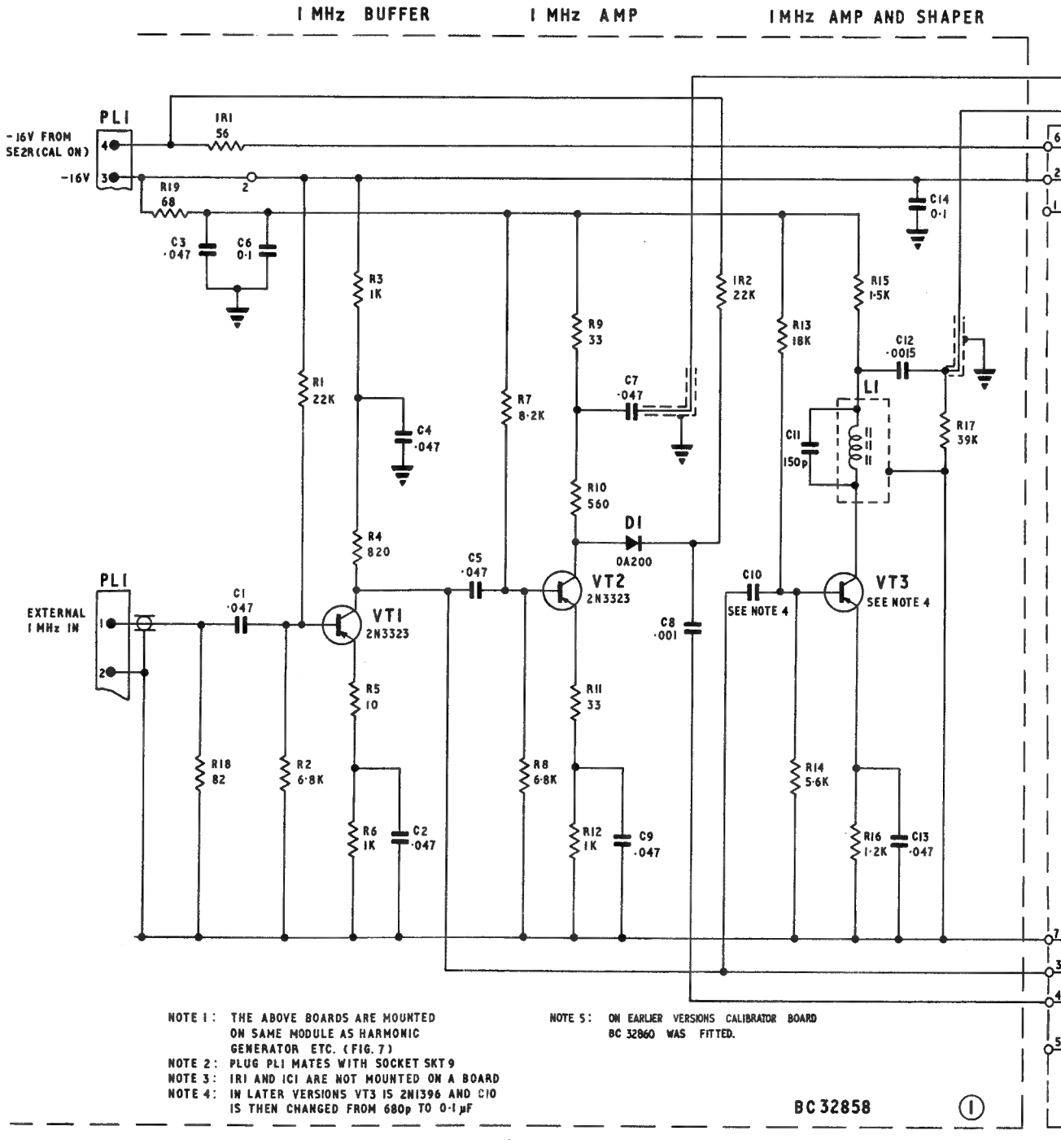
1MHz OSCILLATOR AND CALIBRATOR
(BA41745)

NOTE. 1. IN THE RA.1218 AND RA.1219 RECEIVERS THE OSCILLATOR SECTION IS NOT USED AND THE CRYSTAL XL1 IS REMOVED

NOTE. 2. ON EARLIER VERSIONS CALIBRATOR BOARD BA32860 WAS FITTED

Fig. L-6

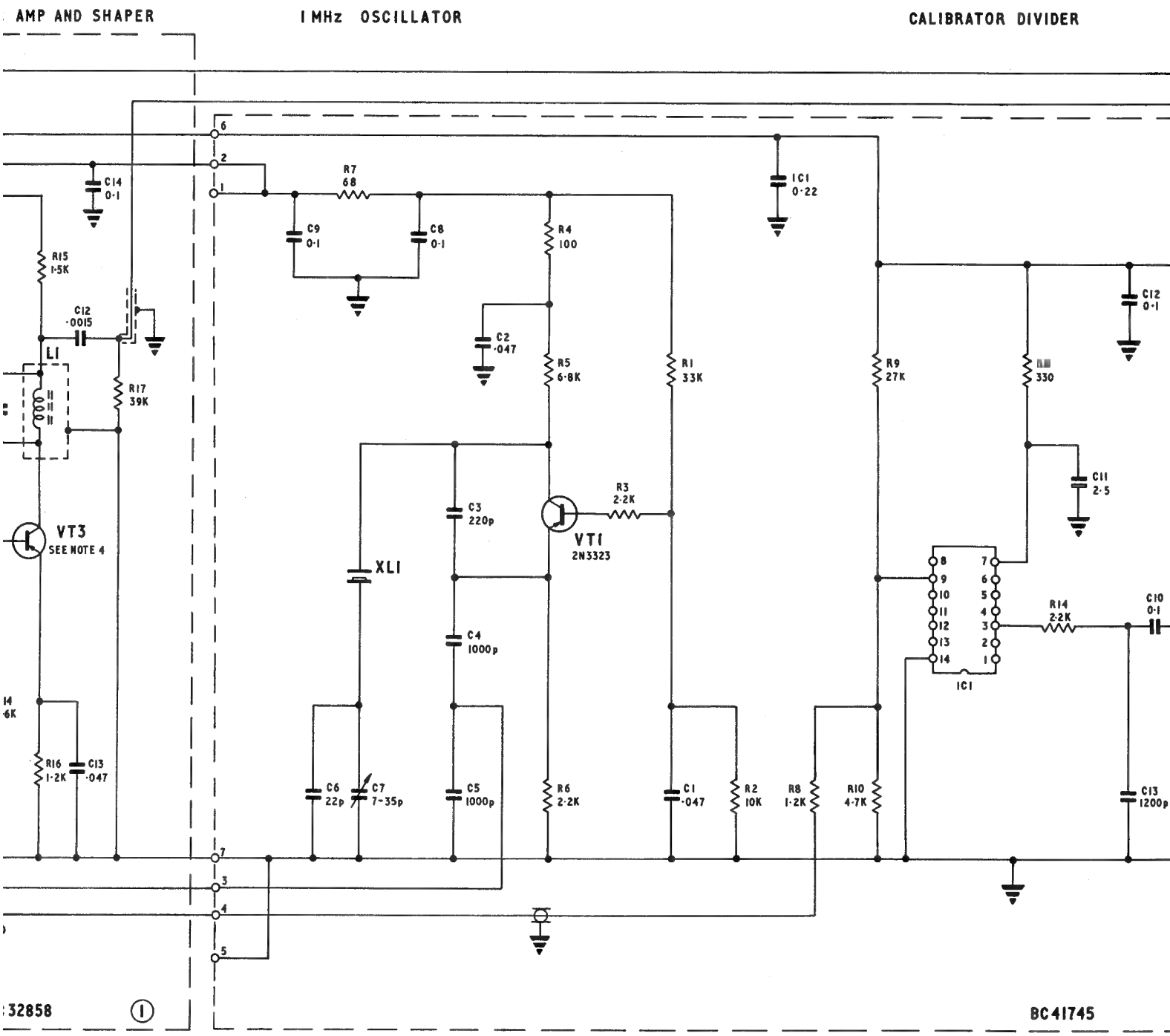
Layout : 1MHz Amplifier Oscillator and Calibrator



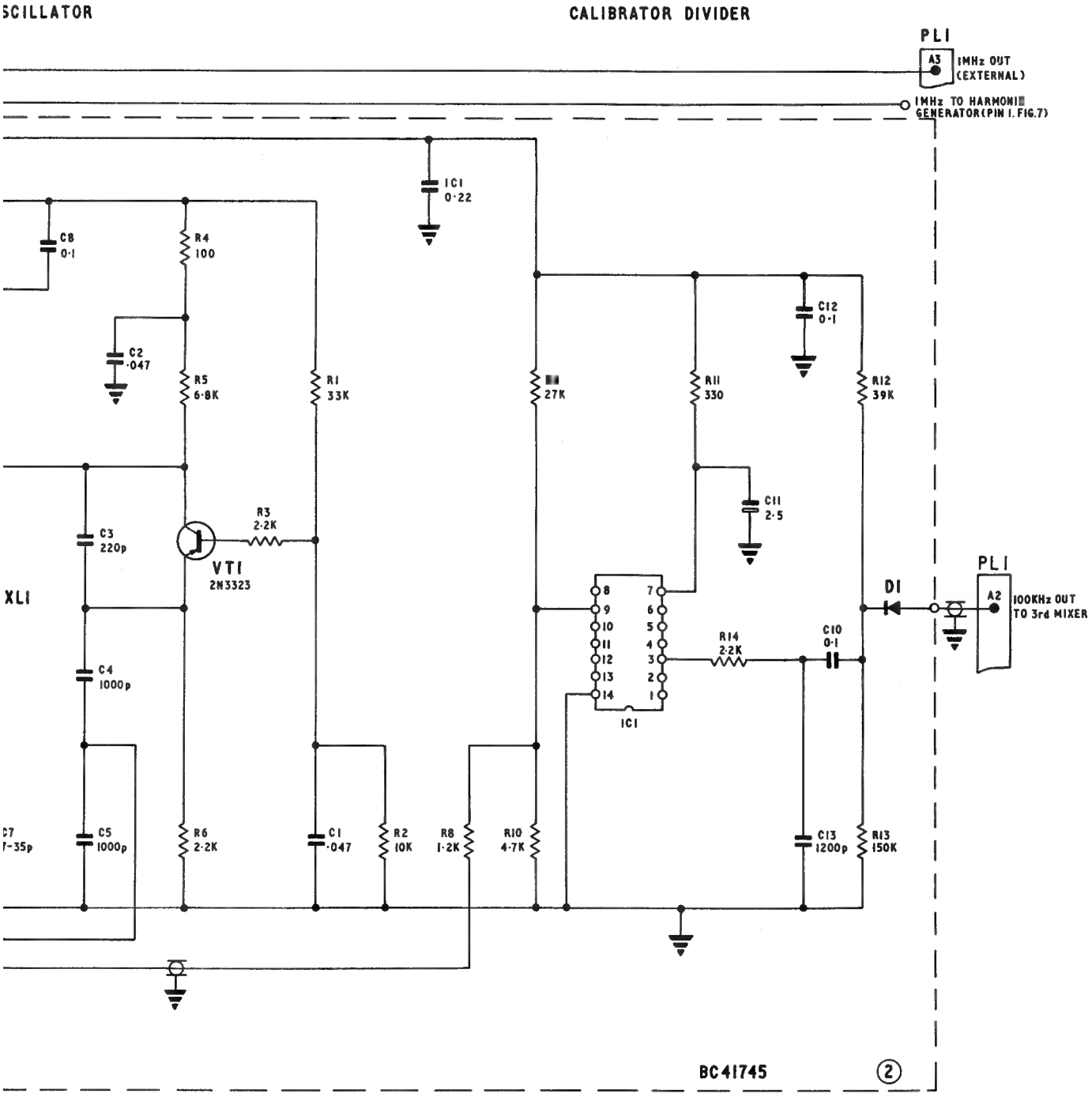
NOTE 1: THE ABOVE BOARDS ARE MOUNTED ON SAME MODULE AS HARMONIC GENERATOR ETC. (FIG. 7)
NOTE 2: PLUG PL1 MATES WITH SOCKET SKT 9
NOTE 3: IR1 AND IC1 ARE NOT MOUNTED ON A BOARD
NOTE 4: IN LATER VERSIONS VT3 IS 2N1396 AND C10 IS THEN CHANGED FROM 680p TO 0·1 μF
NOTE 5: ON EARLIER VERSIONS CALIBRATOR BOARD BC 32860 WAS FITTED.

SC28285/B	281/6
1 2 3 4 5 6 7 8 9 10	

Circuit : 1MHz A

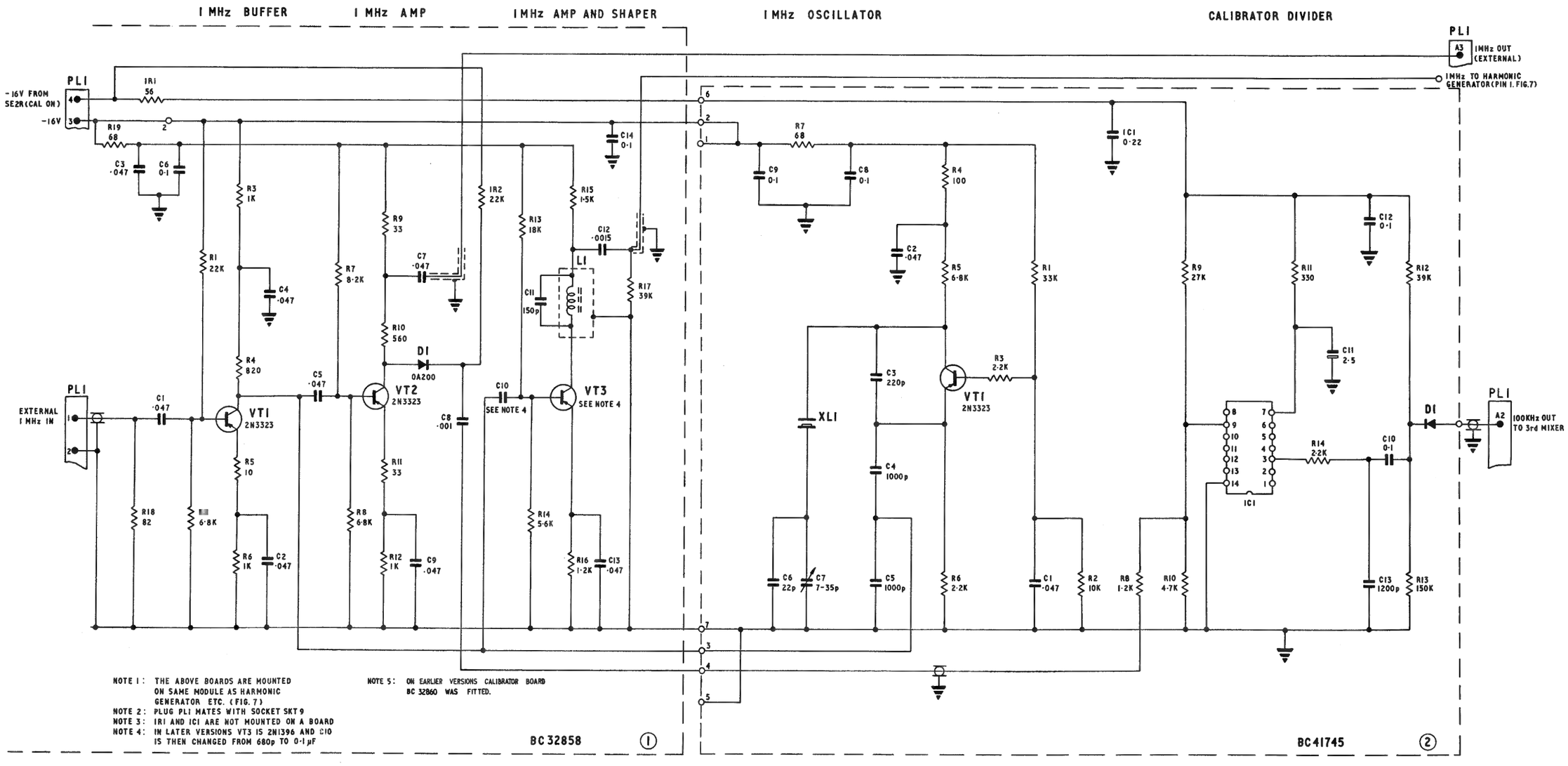


Circuit : 1MHz Amplifiers,Oscillator and Calibrator



scillator and Calibrator

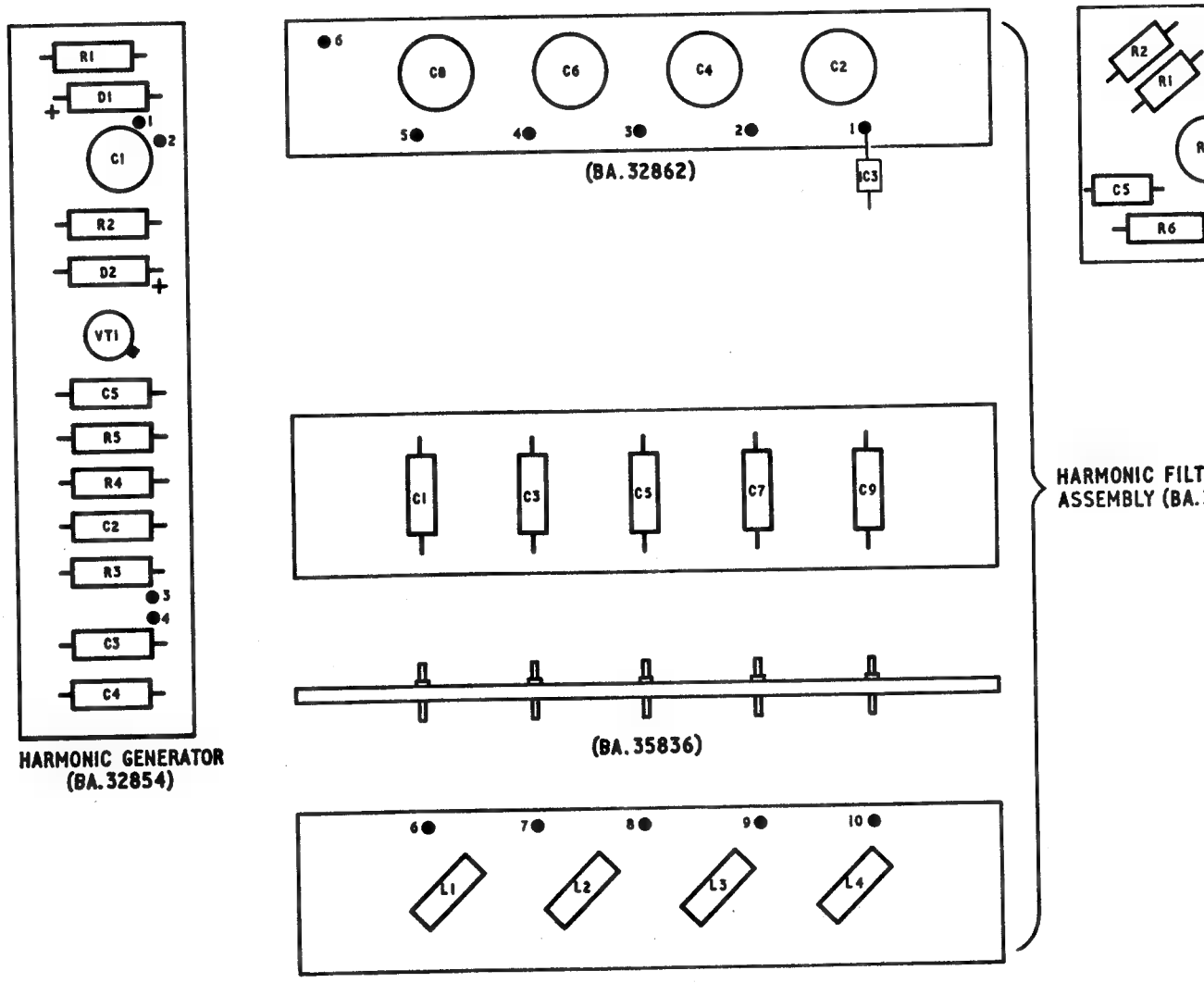
Fig. 6



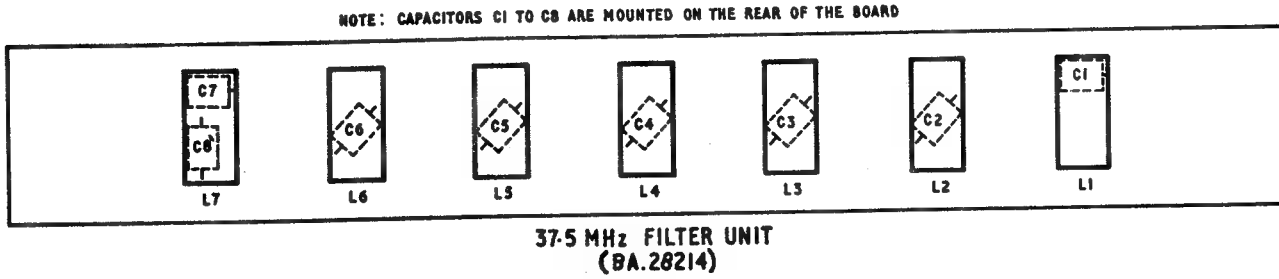
RC28285/B	281/6
1 2 5 7 9 10	

Circuit : 1MHz Amplifiers,Oscillator and Calibrator

Fig. 6



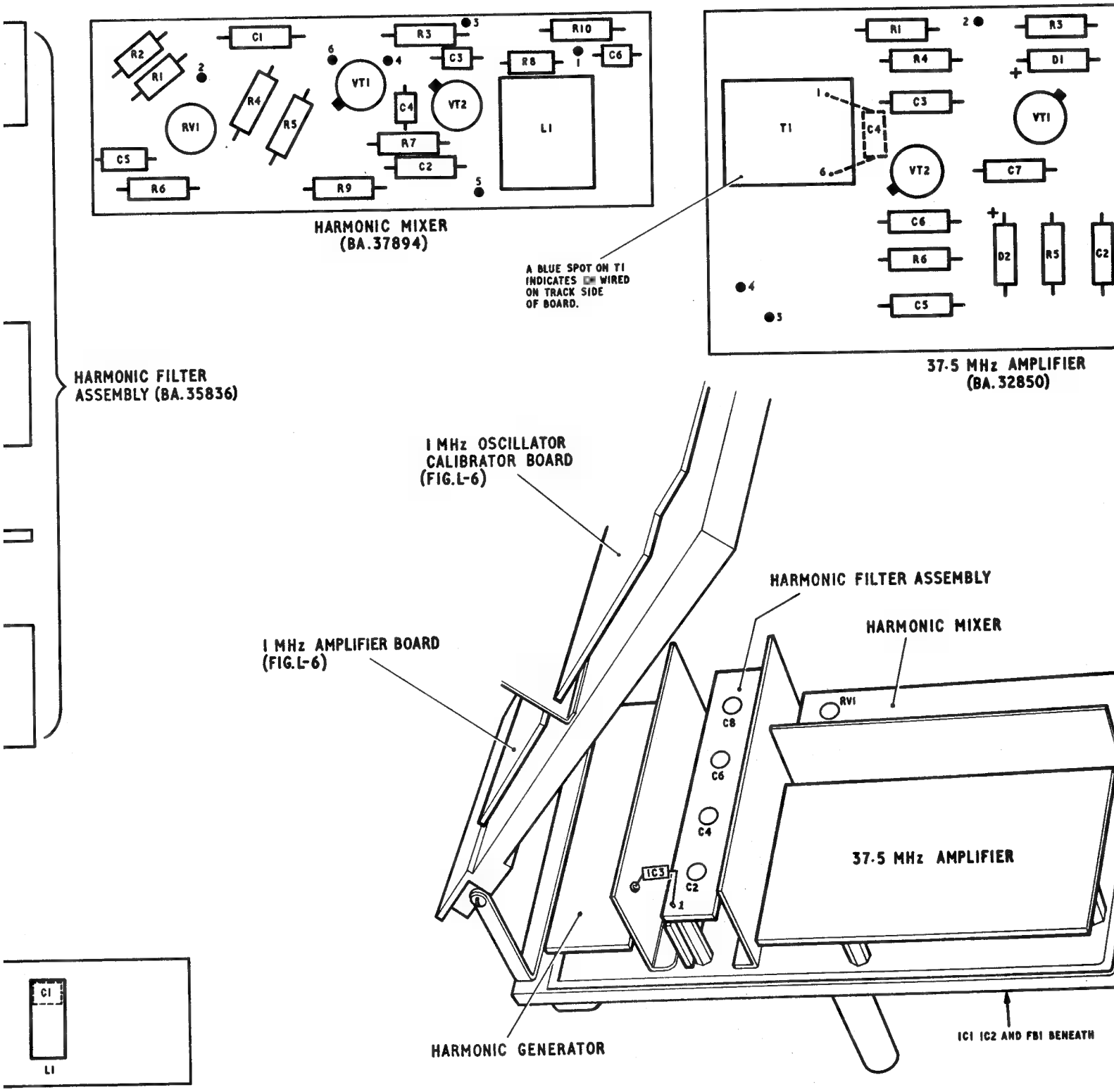
NOTE: CAPACITORS C1 TO C8 ARE MOUNTED ON THE REAR OF THE BOARD



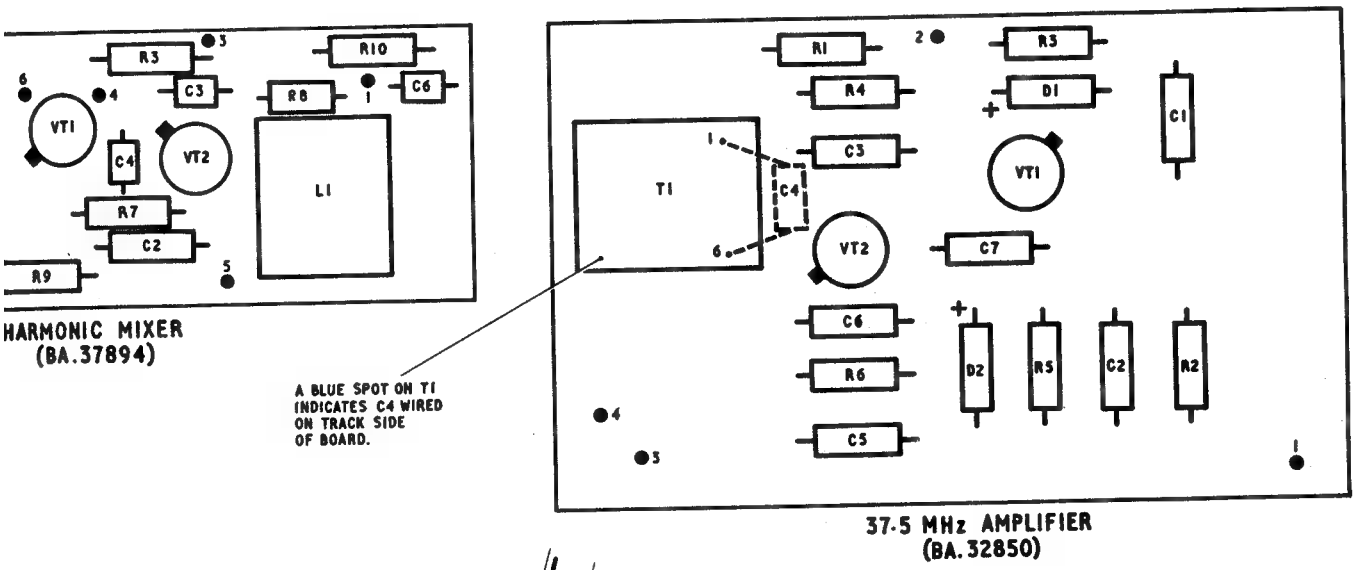
37·5 MHz FILTER UNIT
(BA.28214)

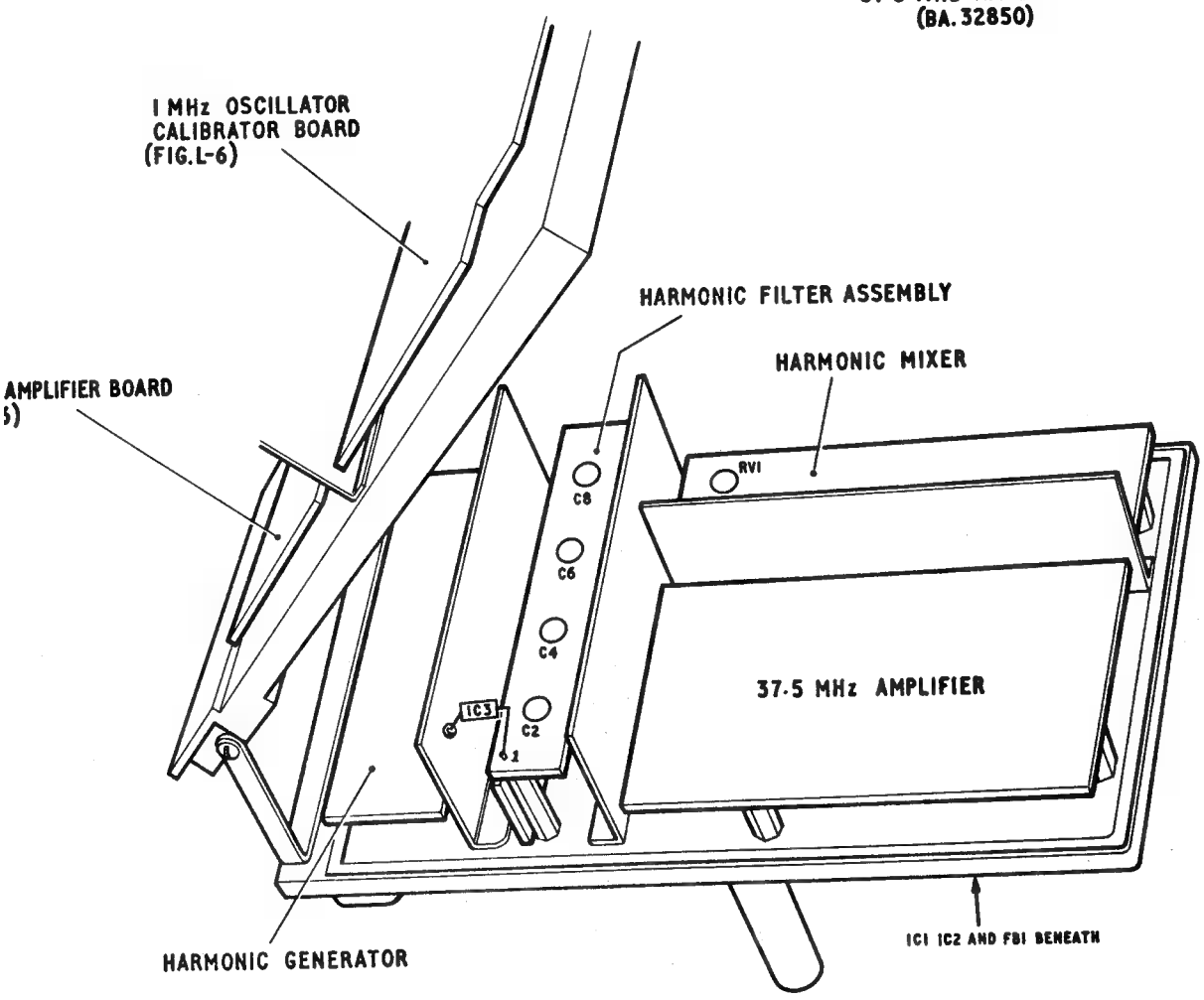
Fig. L-7

Component Layouts: 3

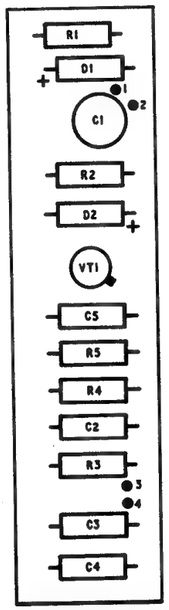


nent Layouts: 37·5 MHz Generator and 37·5 MHz Filter Unit

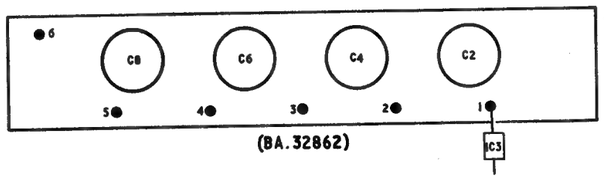




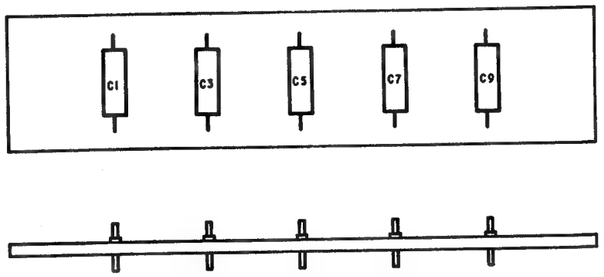
Generator and 37·5 MHz Filter Unit



HARMONIC GENERATOR
(BA.32854)

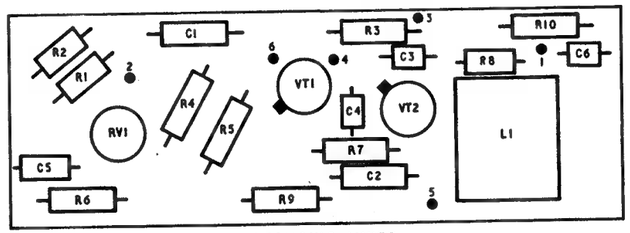


(BA.32862)

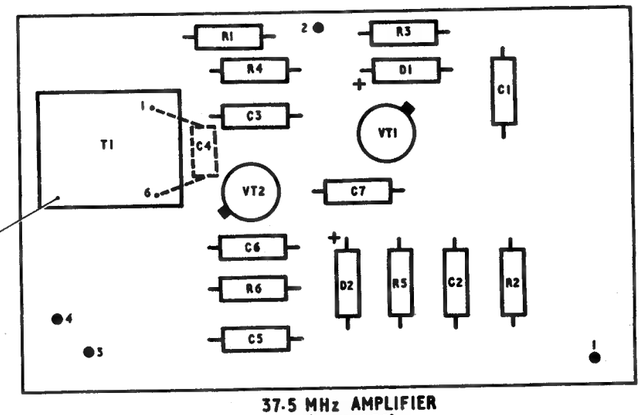


(BA.35836)

HARMONIC FILTER
ASSEMBLY (BA.35836)

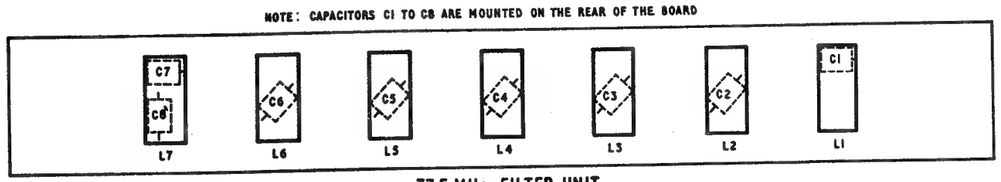


HARMONIC MIXER
(BA.37894)



A BLUE SPOT ON T1
INDICATES C4 WIRED
ON TRACK SIDE
OF BOARD.

37·5 MHz AMPLIFIER
(BA.32850)



37·5 MHz FILTER UNIT
(BA.28214)

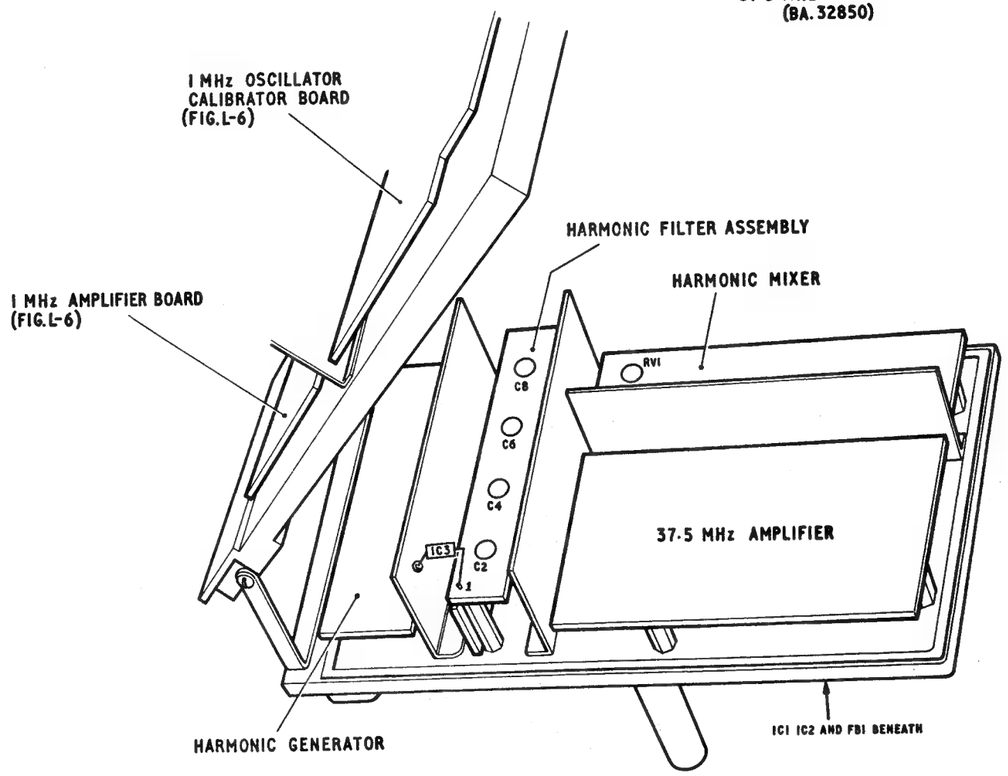
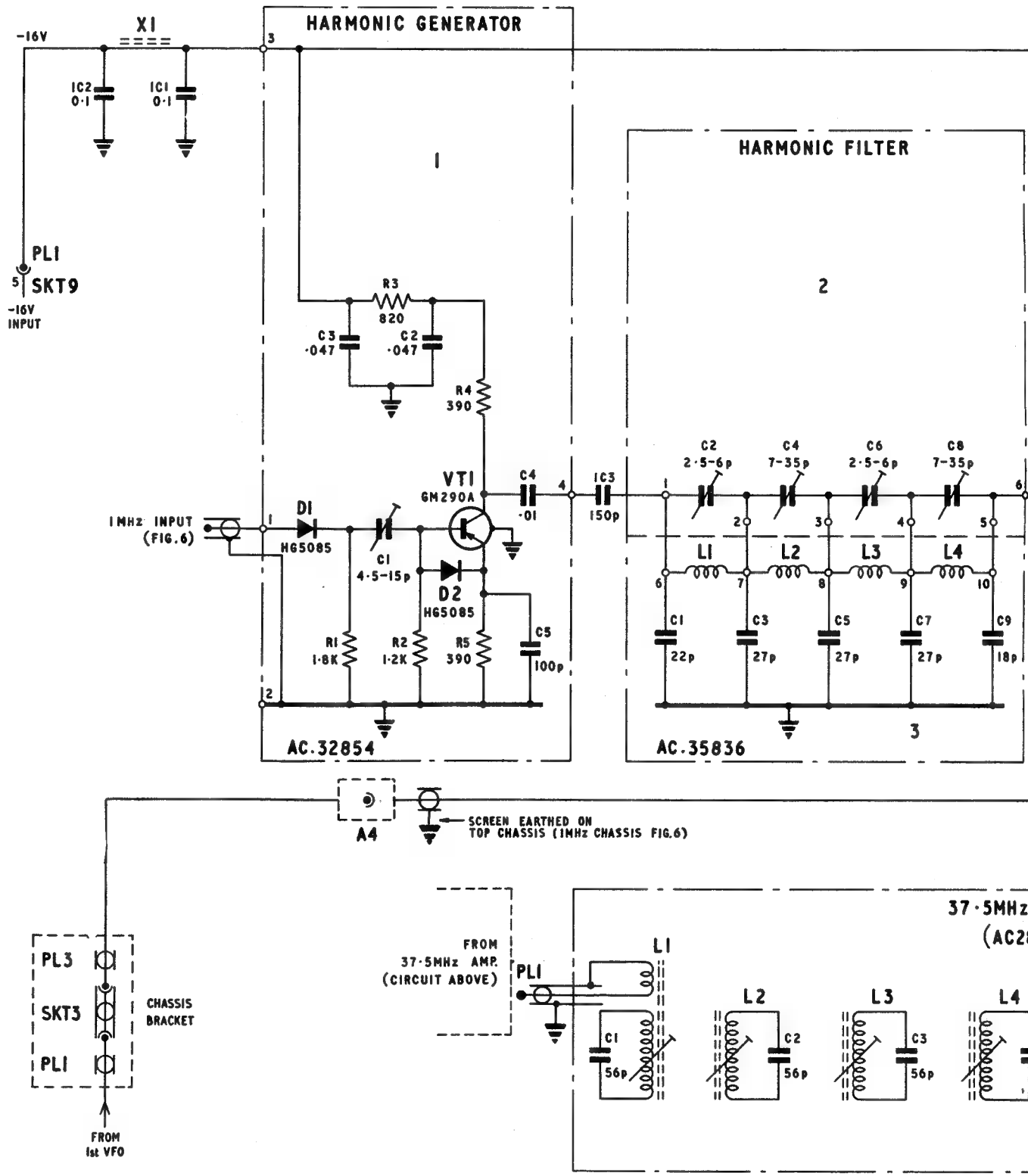


Fig. L-7

Component Layouts: 37·5 MHz Generator and 37·5 MHz Filter Unit

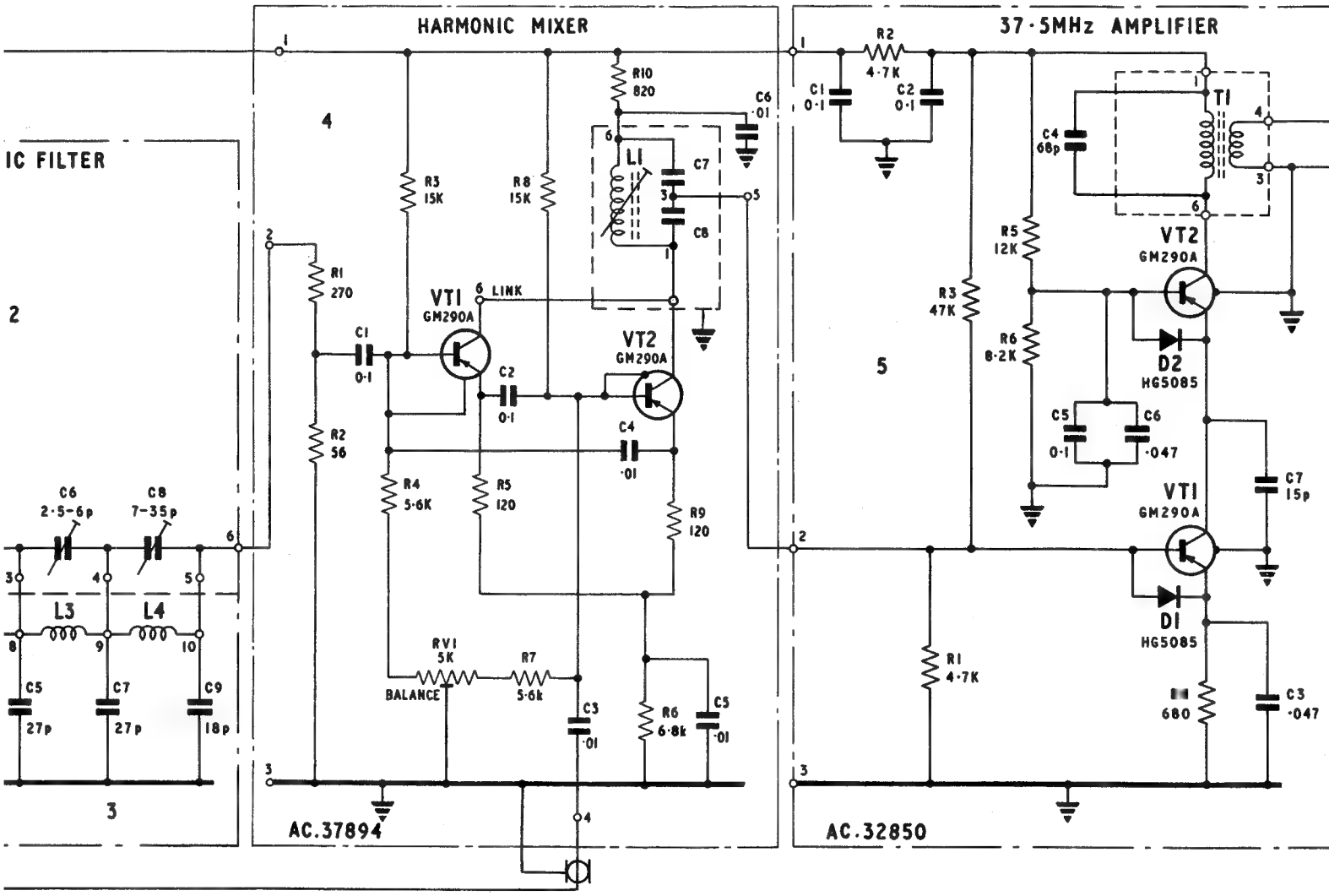


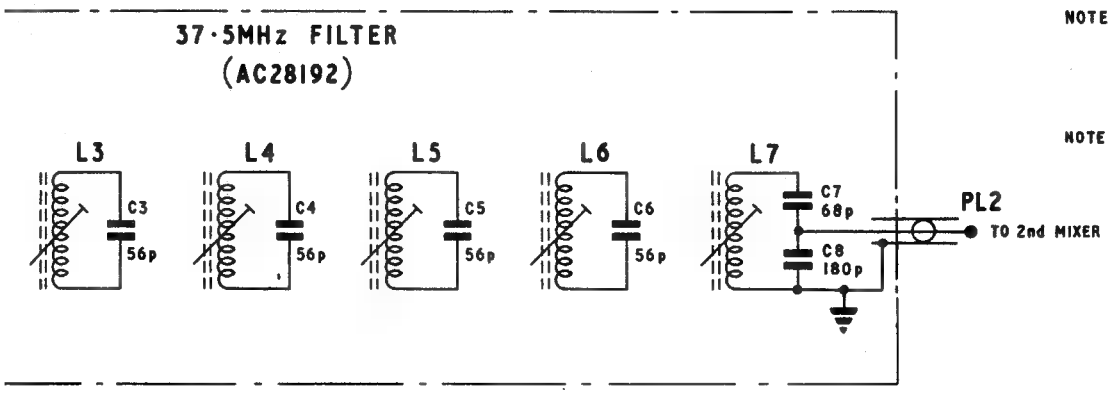
BC28284/8	281/7
1 2 3	

AC28192
3 4 5

Circuits: Harmonic Gen

(37·5

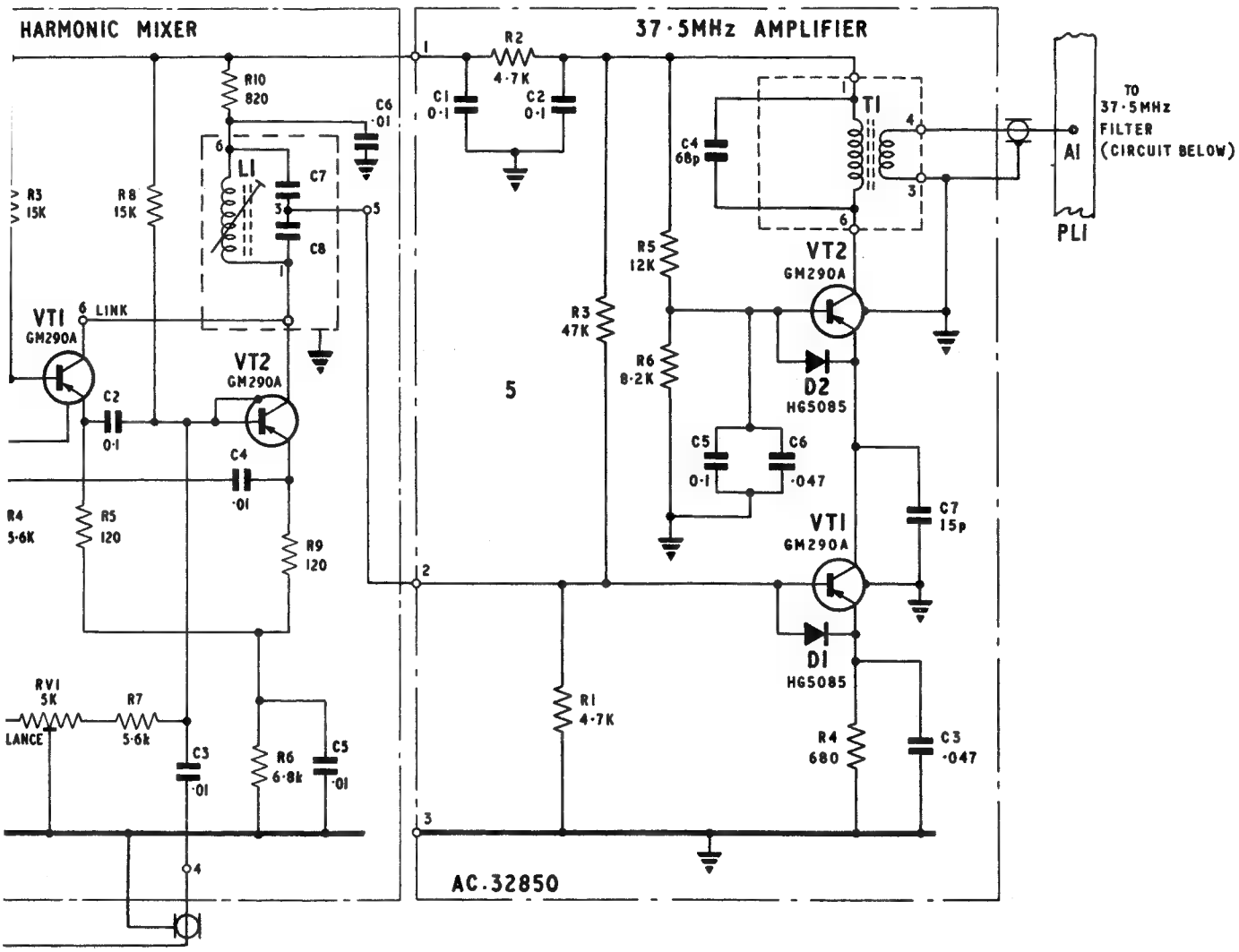


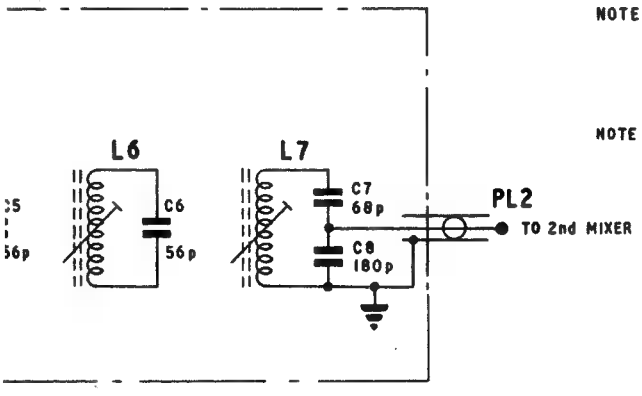


NOTE 1 THE BOARDS 1 TO 5 ARE MOUNTED ON THE SAME MODULE AS THE 1MHz OSCILLATOR AND CALIBRATOR (FIG.6)

NOTE 2 COMPONENTS PREFIXED 1 ARE MOUNTED ON BASE OF MODULE CHASSIS.

:Harmonic Generator Mixer and 37·5MHz Filter
(37·5MHz Generator)

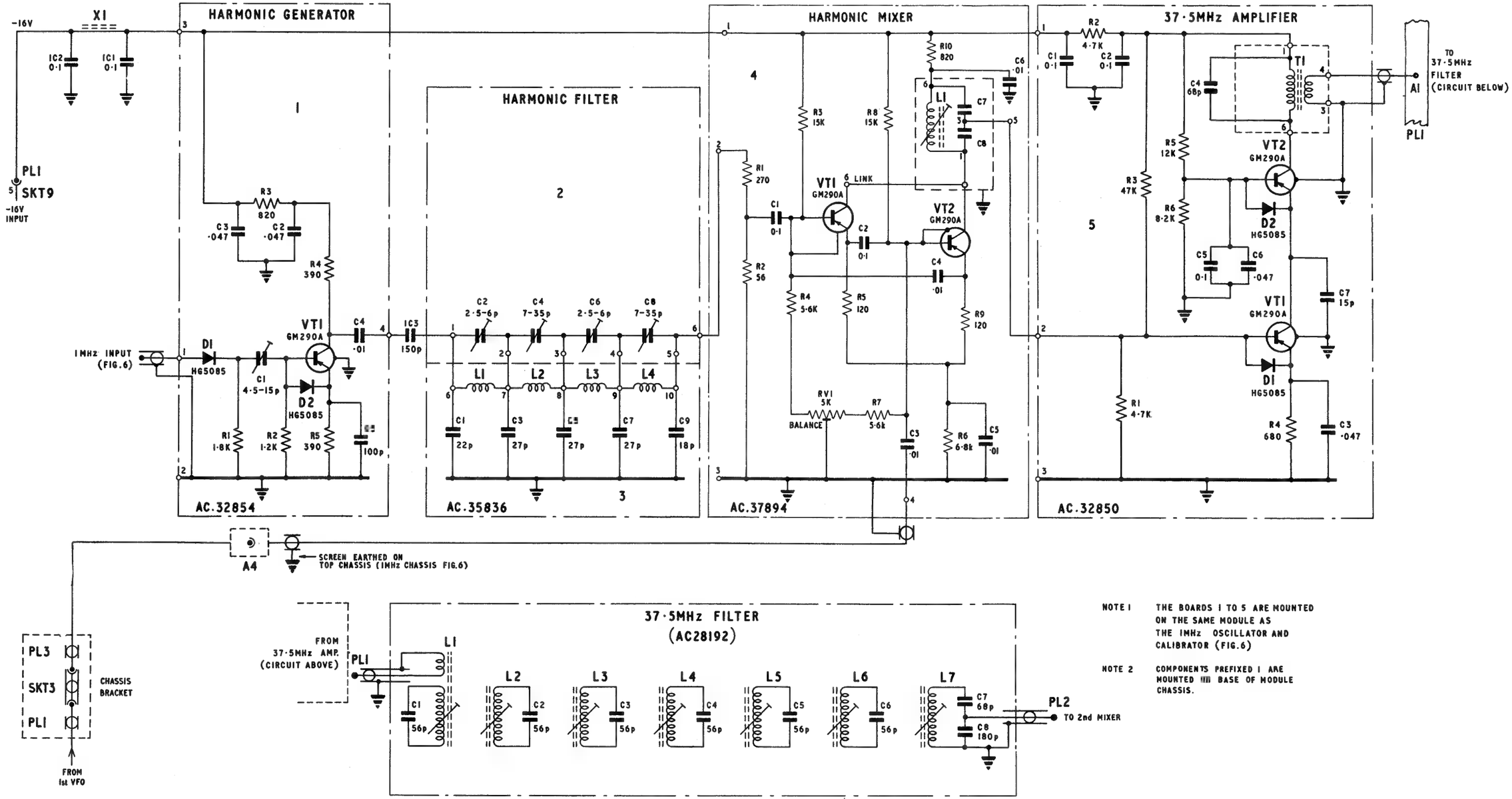




NOTE 1 THE BOARDS 1 TO 5 ARE MOUNTED ON THE SAME MODULE AS THE 1MHz OSCILLATOR AND CALIBRATOR (FIG.6)

NOTE 2 COMPONENTS PREFIXED 1 ARE MOUNTED ON BASE OF MODULE CHASSIS.

xer and 37·5MHz Filter Fig.7
nerator)



NOTE 1 THE BOARDS 1 TO 5 ARE MOUNTED ON THE SAME MODULE AS THE 1MHz OSCILLATOR AND CALIBRATOR (FIG.6)

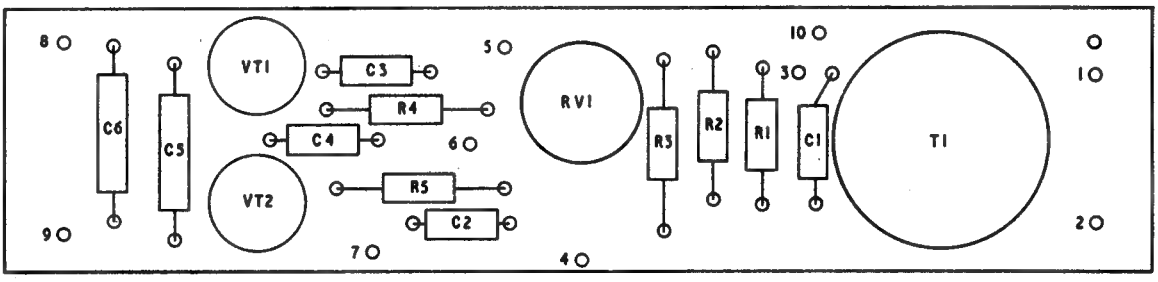
NOTE 2 COMPONENTS PREFIXED 1 ARE MOUNTED ON BASE OF MODULE CHASSIS.

BC28284/B	281/7
1 2 3	

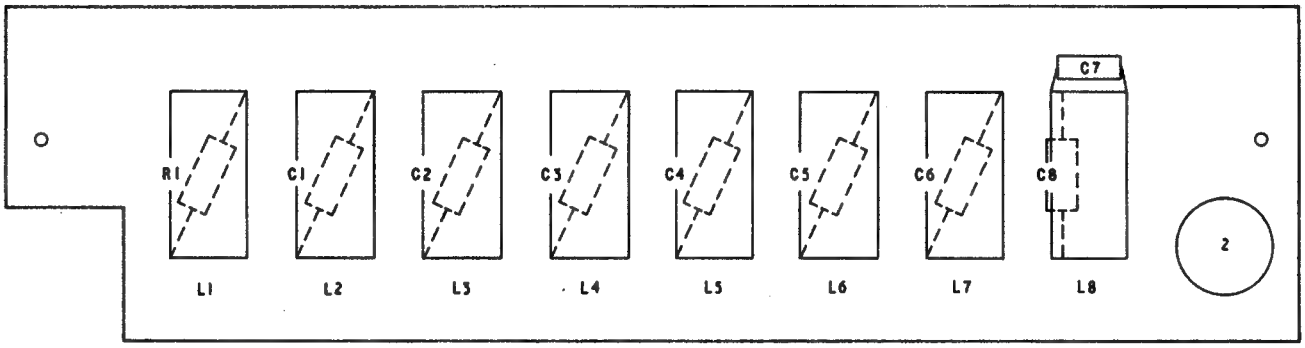
AC28192
3 4 5

Circuits: Harmonic Generator Mixer and 37·5MHz Filter (37·5 MHz Generator)

Fig.7



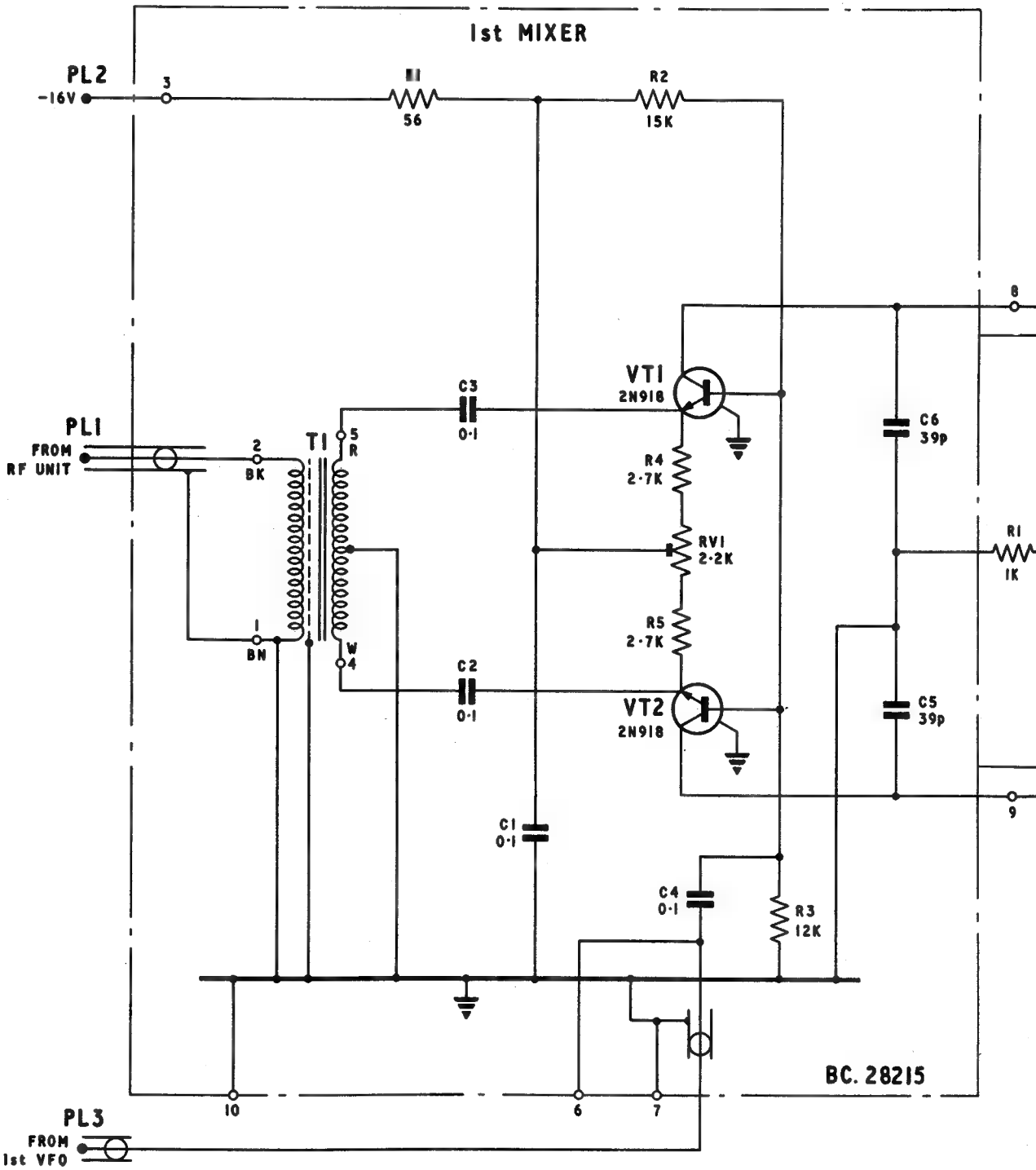
1st MIXER
(BA.28215)



40 MHz FILTER
(BA.28197)

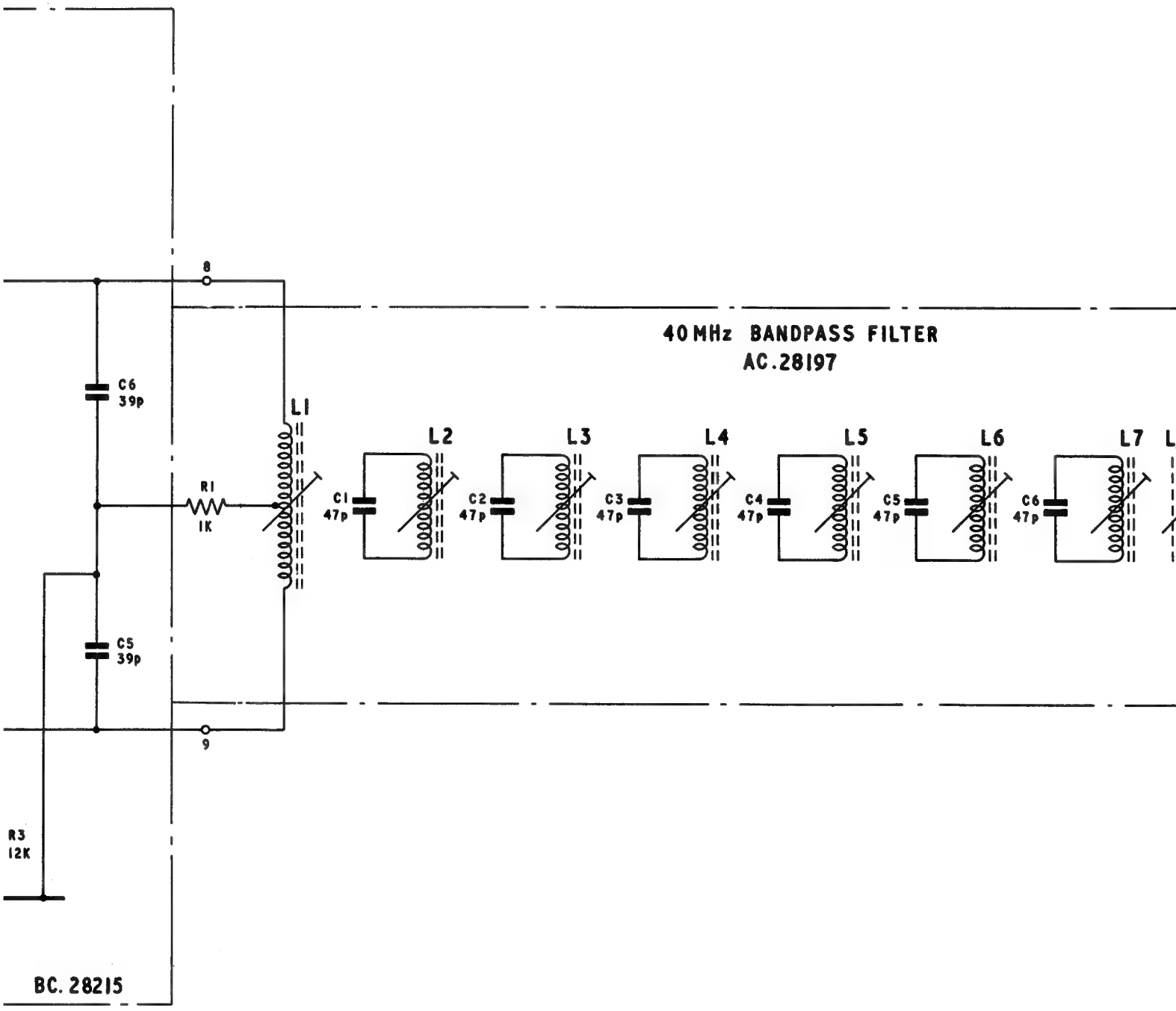
Fig. L-8 Component Layout: 1st Mixer and 40 MHz Filter

281/L-8



BC2821	281/8
2 4 7	

Circuit :



Circuit : Ist Mixer and 40MHz. Filter

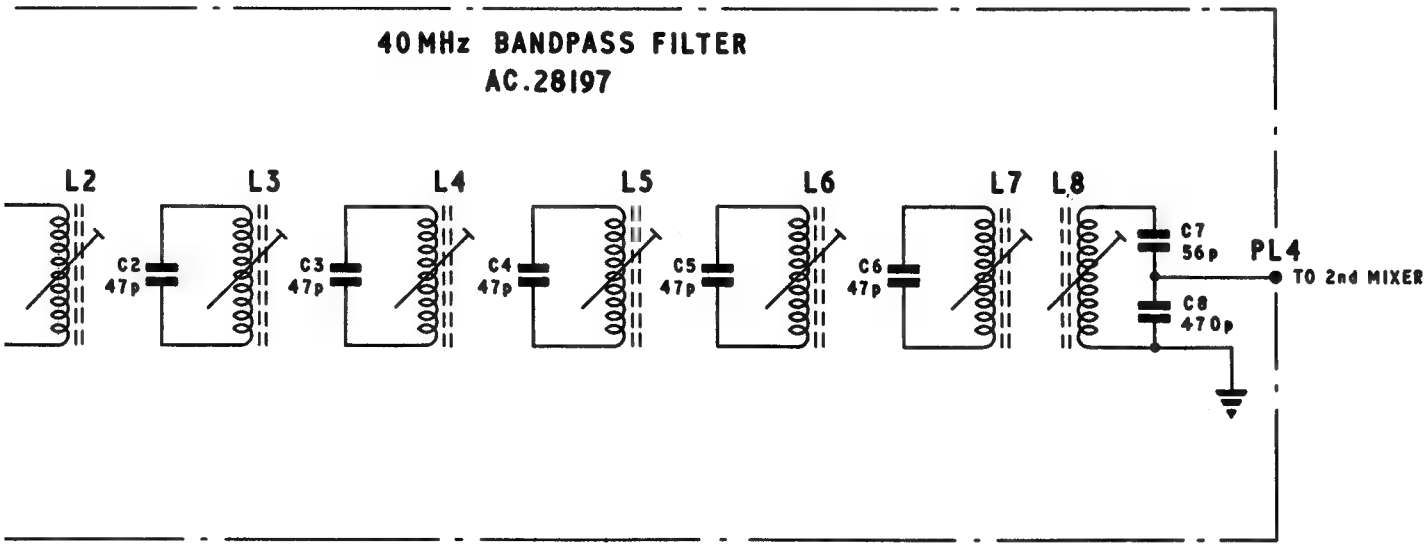
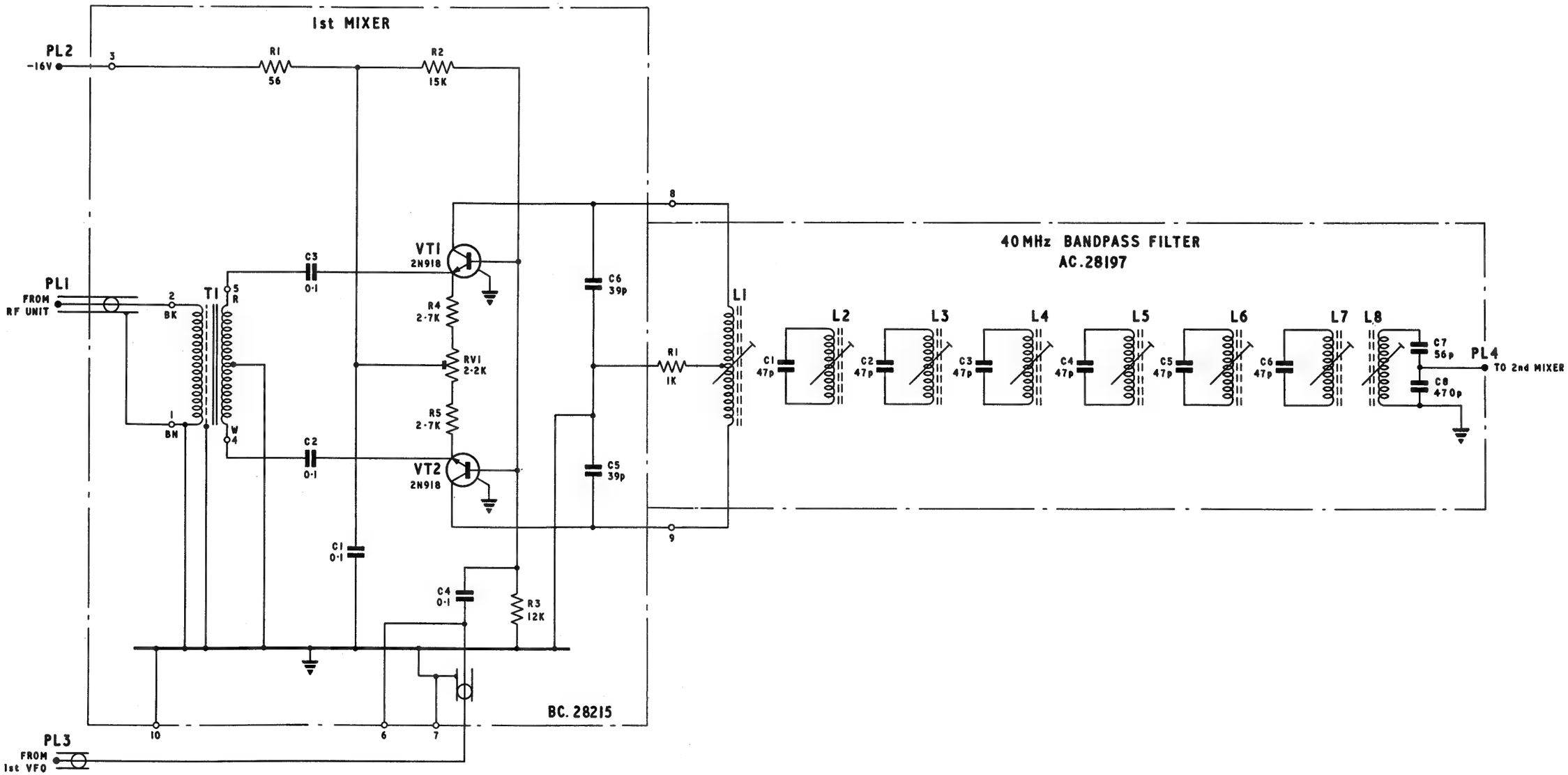


Fig. 8

and 40MHz. Filter



BC28211	281/8
2 4 7	

Circuit : 1st Mixer and 40MHz. Filter

Fig. 8

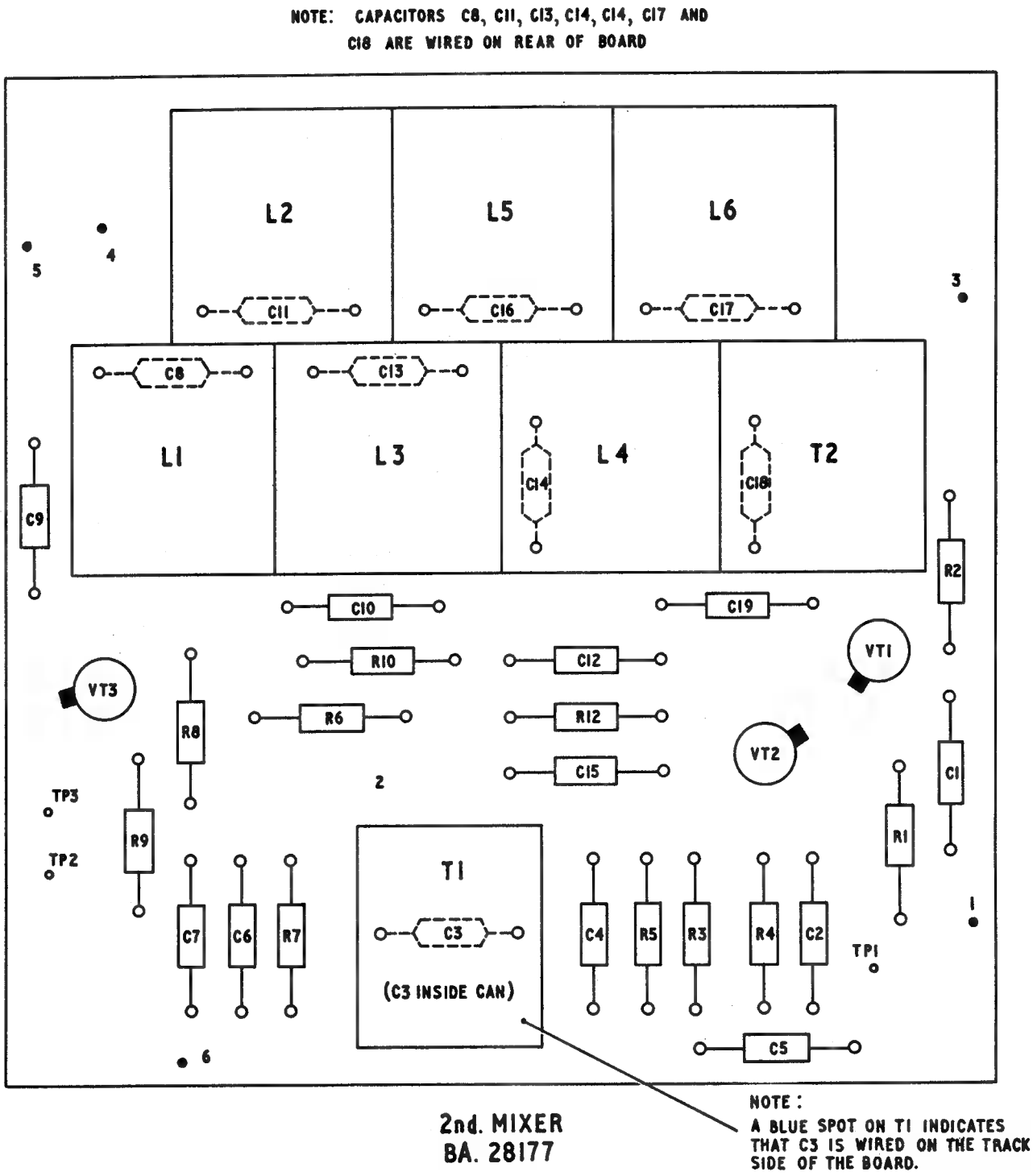
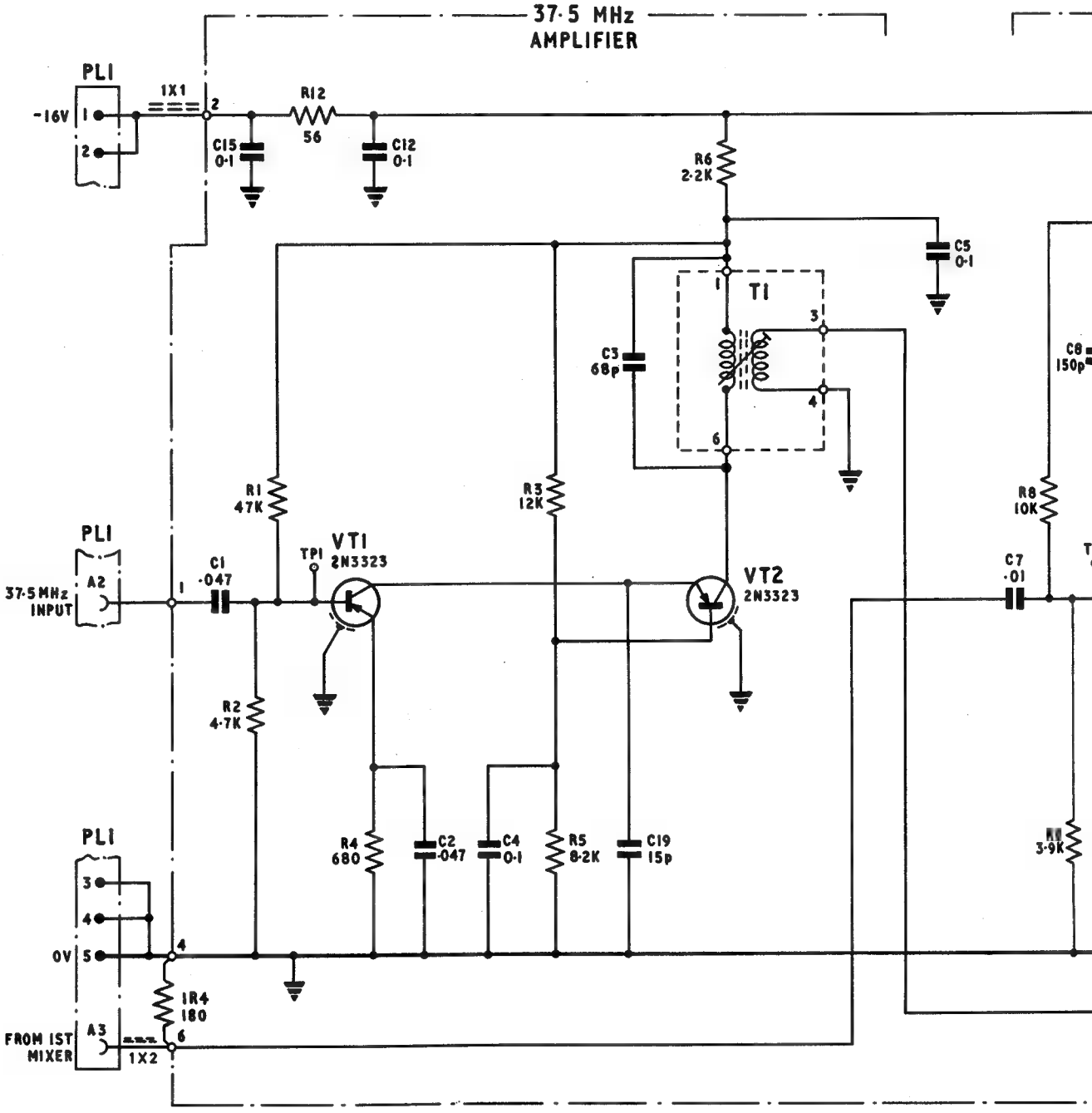


Fig. L-9 Component Layout : 2nd Mixer

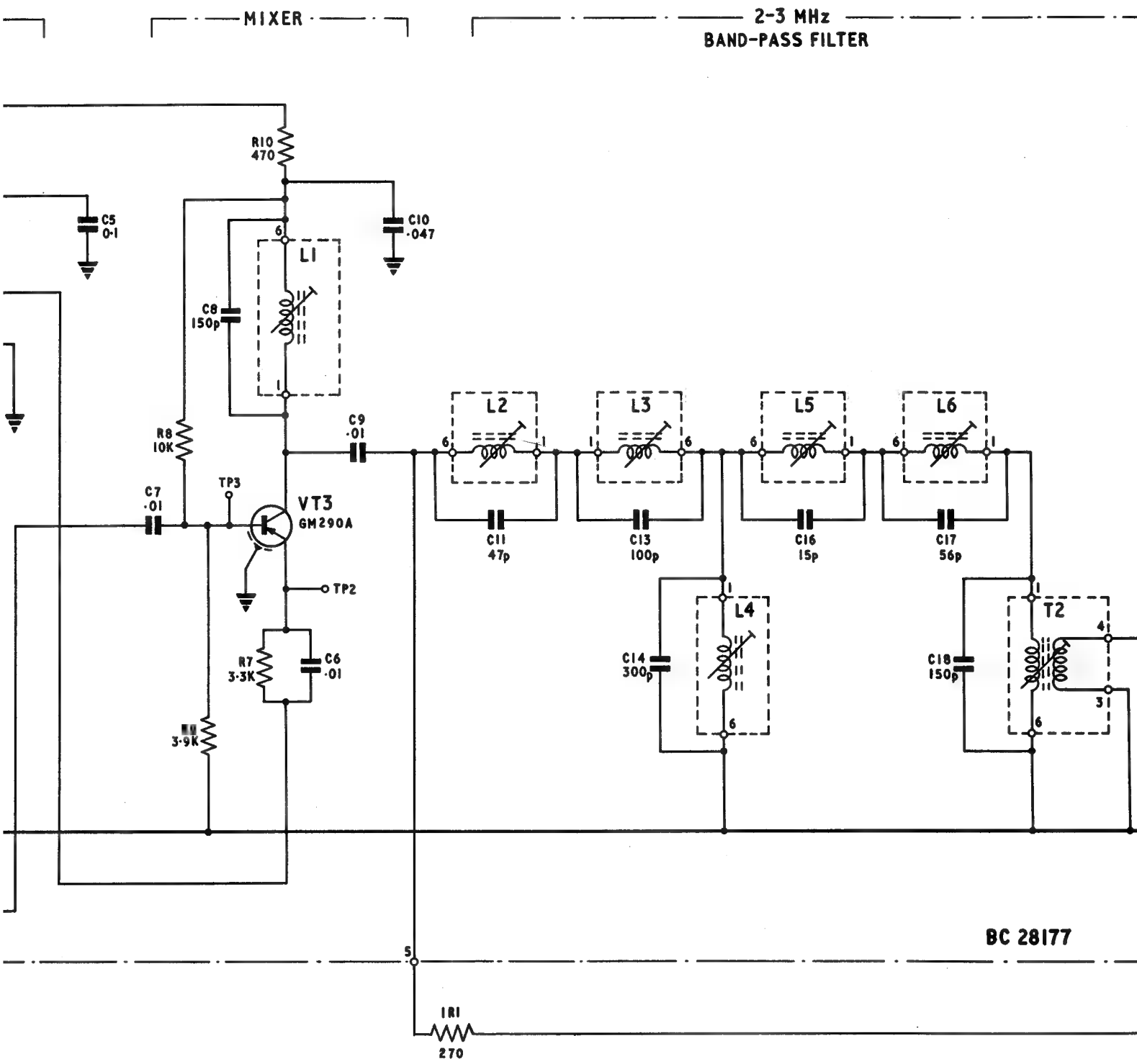
281/L-9



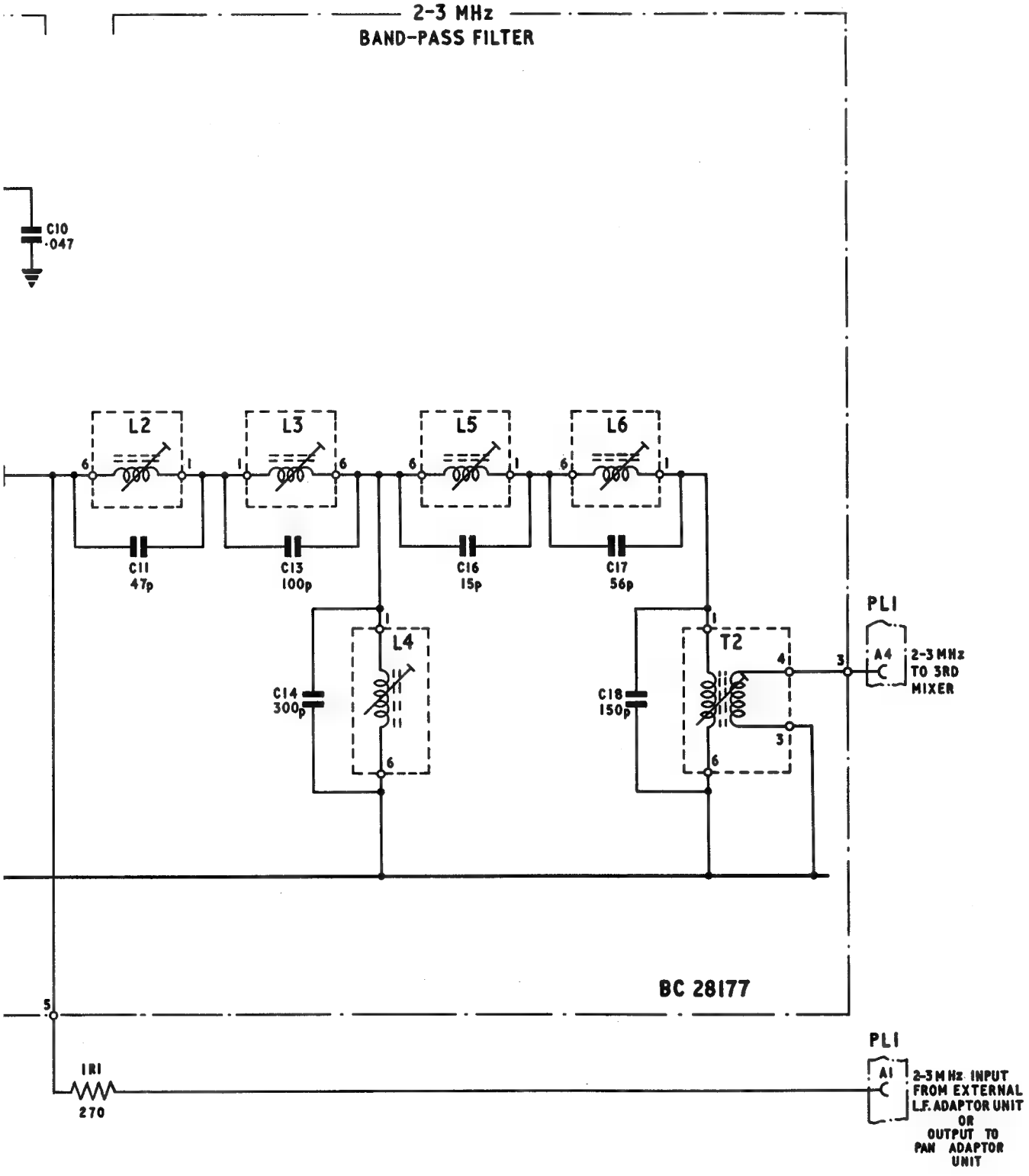
NOTE 1. PL1 ON THIS CIRCUIT MATES WITH SKT7

2. COMPONENTS PREFIXED I ARE NOT MOUNTED ON THE CIRCUIT BOARD

3. ALL COIL CANS TO BE EARTHED

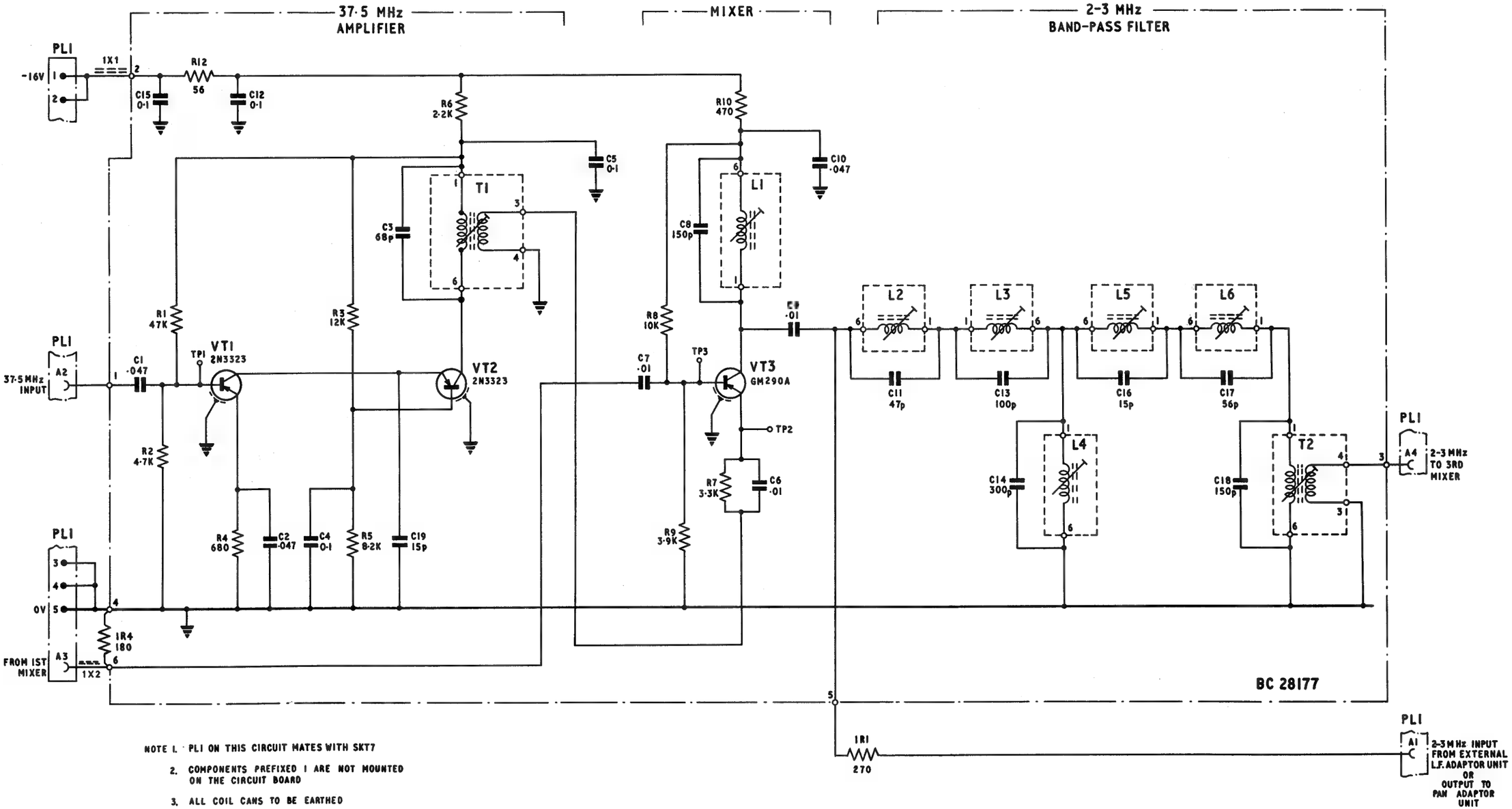


Circuit : 2nd Mixer


2-3 MHz
BAND-PASS FILTER
C10
·047
L2
L3
L5
L6
C11
47p
C13
100p
C16
15p
C17
56p
L4
C14
300p
T2
C18
150p
PL1
A4
2-3 MHz
TO 3RD
MIXER
BC 28177
5
IR1
270
PL1
A1
2-3 MHz INPUT
FROM EXTERNAL
L.F. ADAPTOR UNIT
OR
OUTPUT TO
PAN ADAPTOR
UNIT

d Mixer

Fig.9



NOTE 1. PL1 ON THIS CIRCUIT MATES WITH SKT7

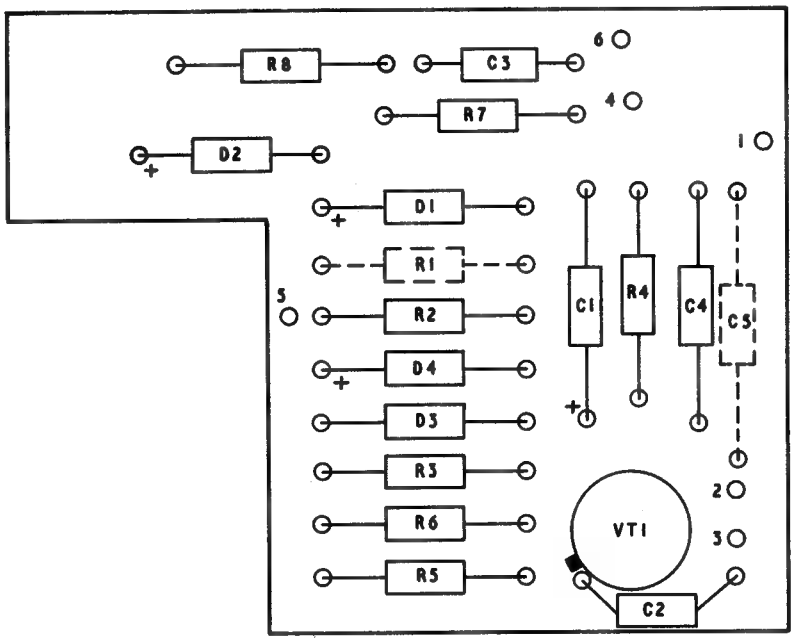
2. COMPONENTS PREFIXED I ARE NOT MOUNTED ON THE CIRCUIT BOARD

3. ALL COIL CANS TO BE EARTHED

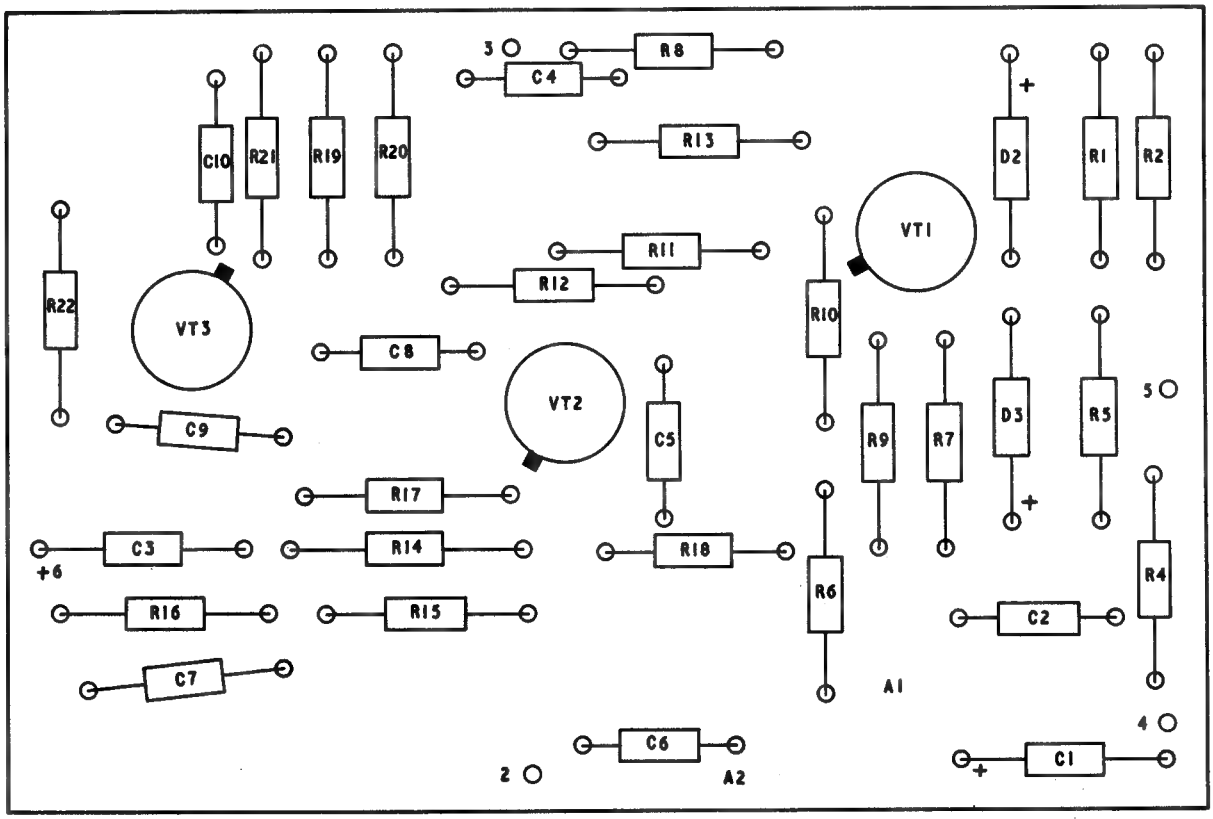
BC30959	281/9
6 9 11 12 14	

Circuit : 2nd Mixer

Fig.9



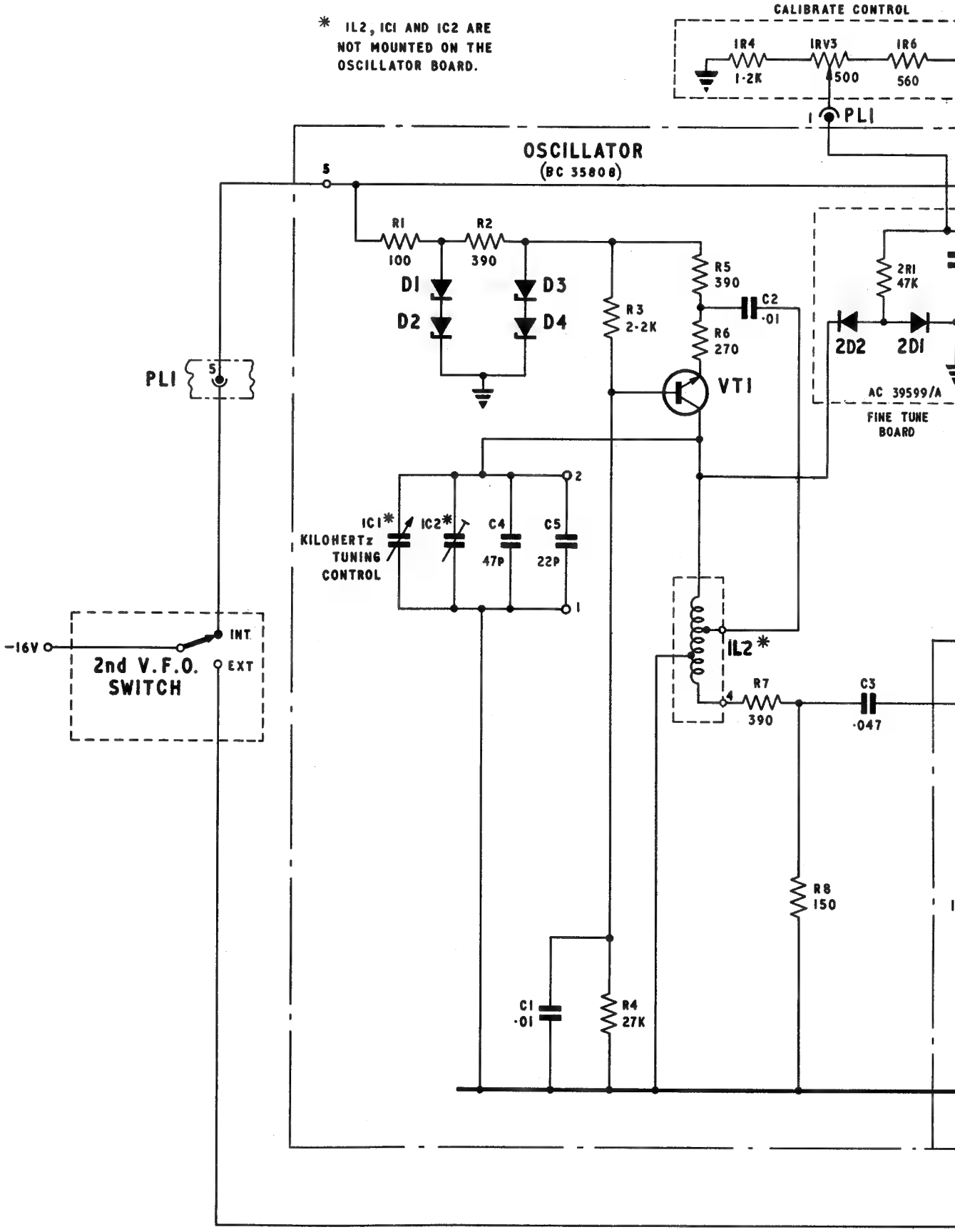
OSCILLATOR BOARD
(BA.35808)



AMPLIFIER BOARD
(BA.35807)

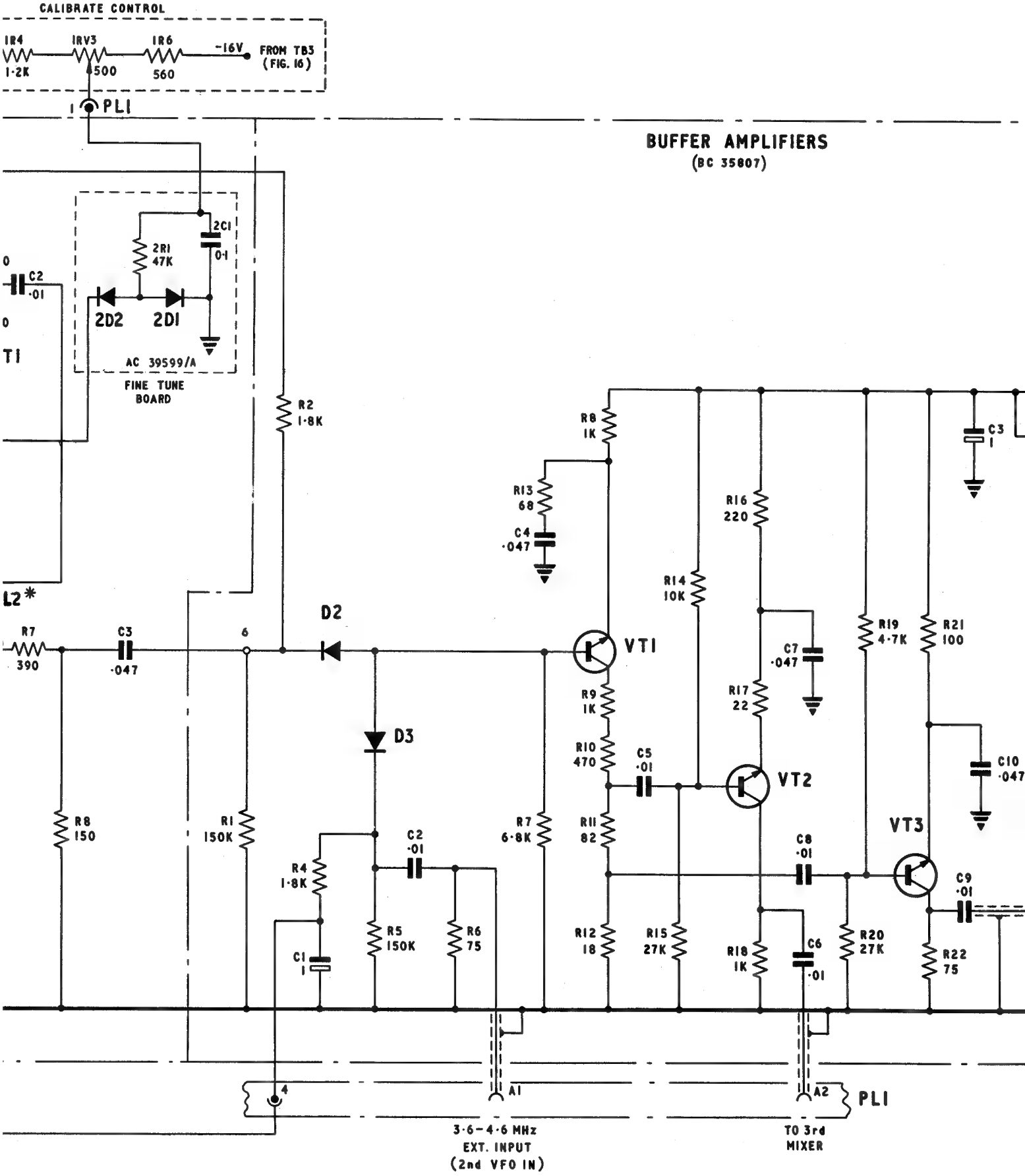
Fig. L-10 Component Layouts: 2nd V.F.O

281/L-10

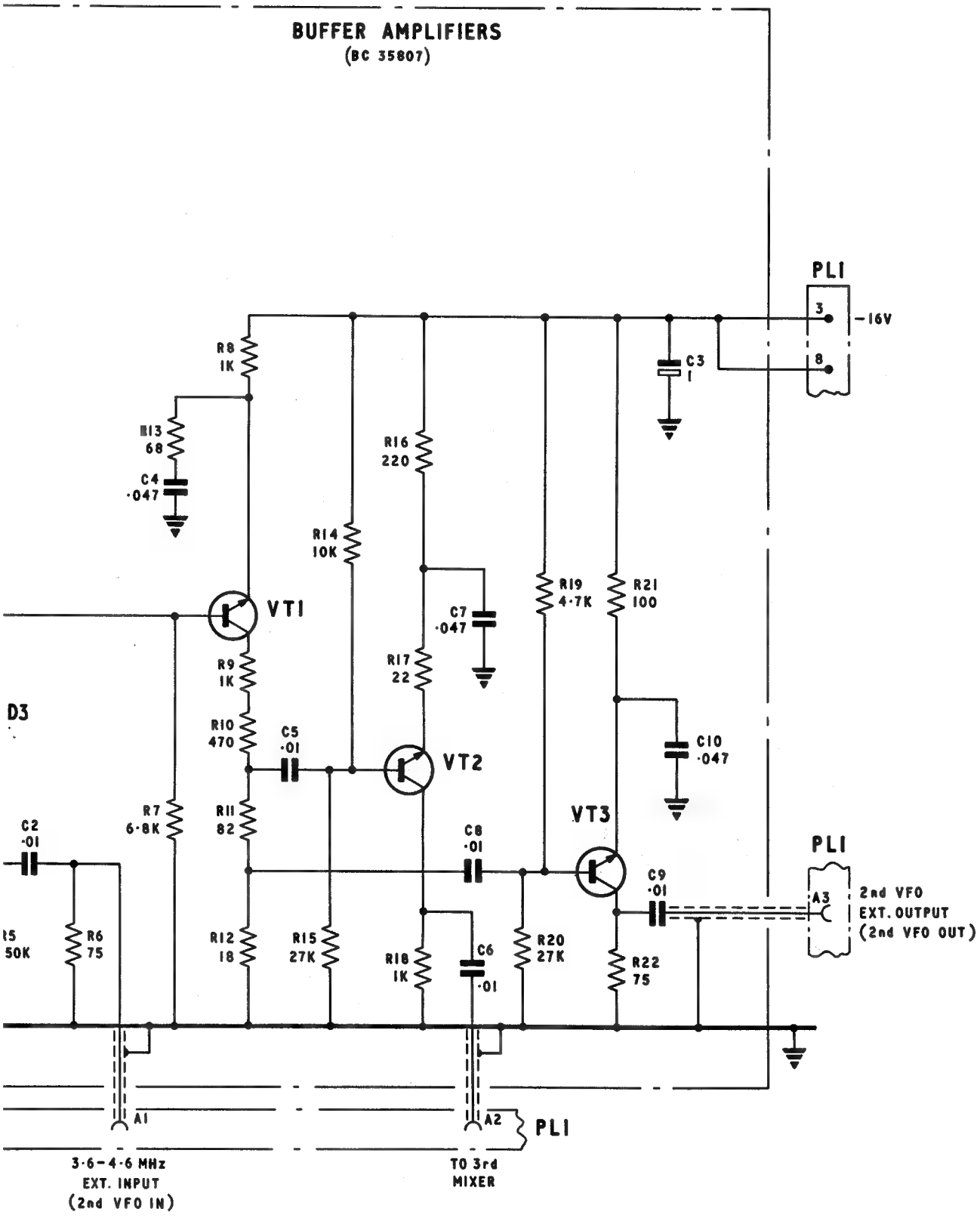


CC28101						281/10
3	5	6	7	8	10	

Cir

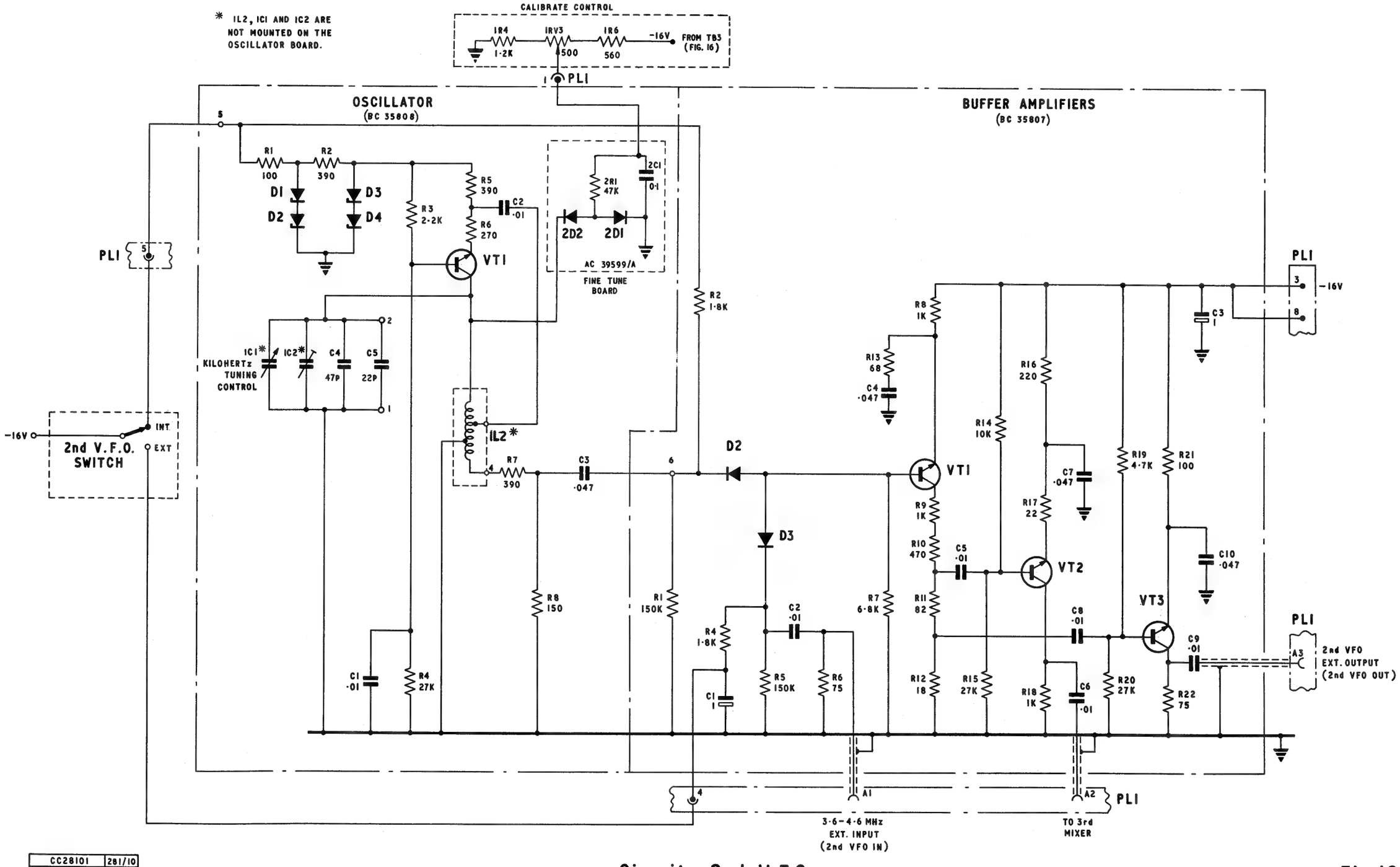


Circuit : 2nd V.F.O.


BUFFER AMPLIFIERS
(BC 35807)
PLI
3
8
-16V
C3
1
R8
1K
R13
68
C4
·047
R16
220
R14
10K
R19
4·7K
R21
100
C7
·047
VT1
R9
1K
R17
22
D3
R10
470
C5
·01
VT2
C10
·047
R7
6·8K
R11
82
VT3
C2
·01
C8
·01
PLI
C9
·01
A3
2nd VFO
EXT. OUTPUT
(2nd VFO OUT)
R6
75
R12
18
R15
27K
R18
1K
C6
·01
R20
27K
R22
75
A1
A2
PLI
3·6-4·6 MHz
EXT. INPUT
(2nd VFO IN)
TO 3rd
MIXER

F.O.

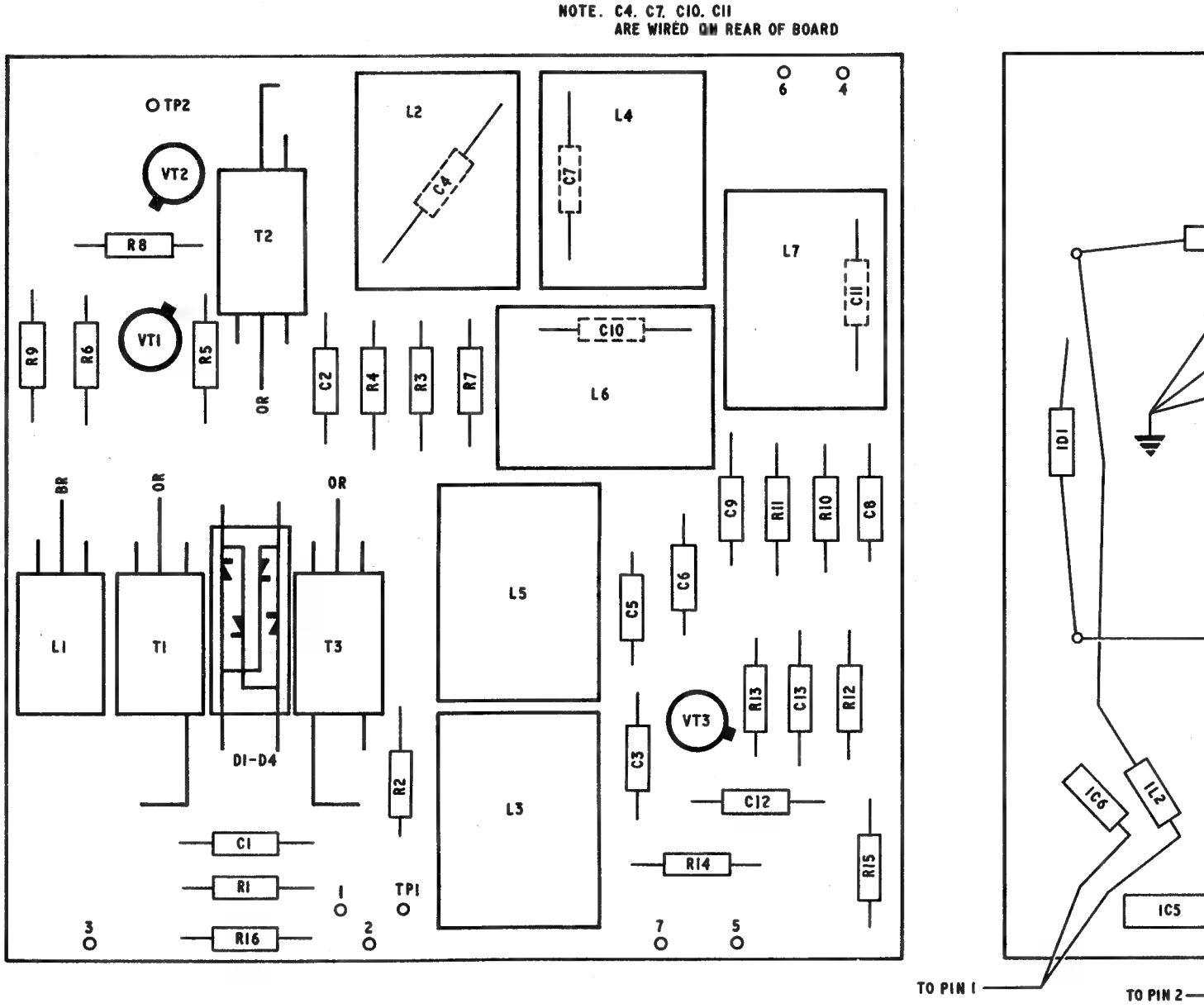
Fig.10



CC28101	281/10
3 5 6 7 8 10	

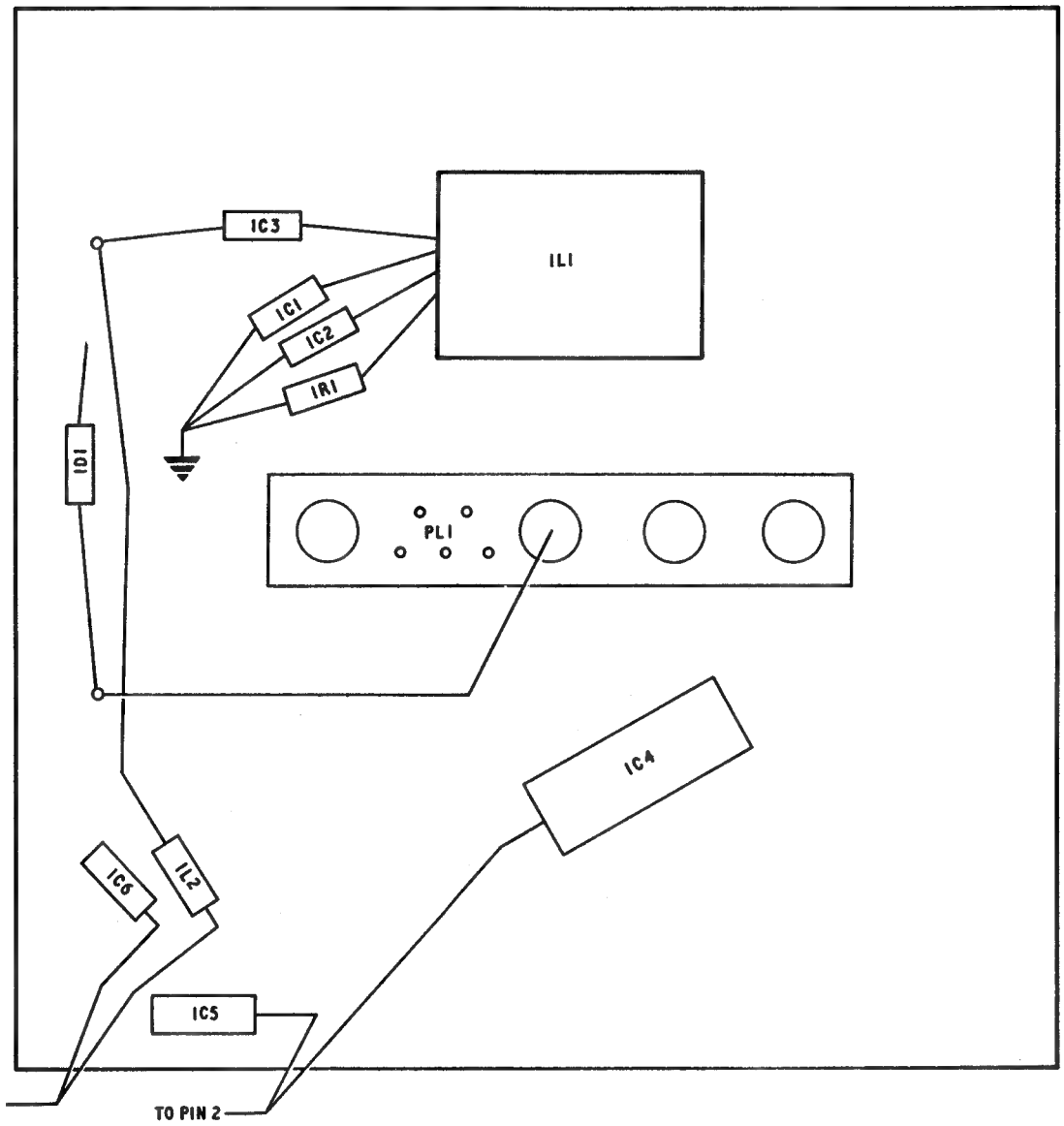
Circuit : 2nd V.F.O.

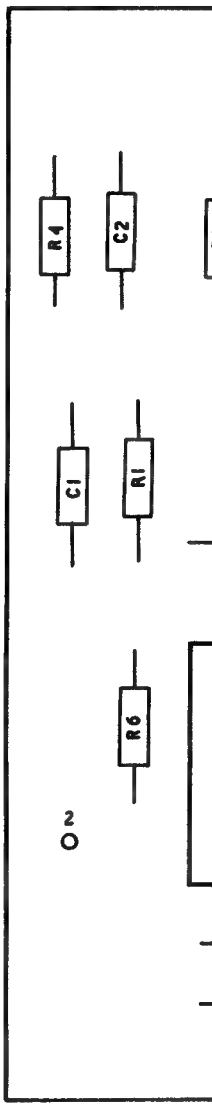
Fig.10



3rd MIXER MODULE
(BA 35966)

Fig. L-11 Component Layout: 3rd Mixer

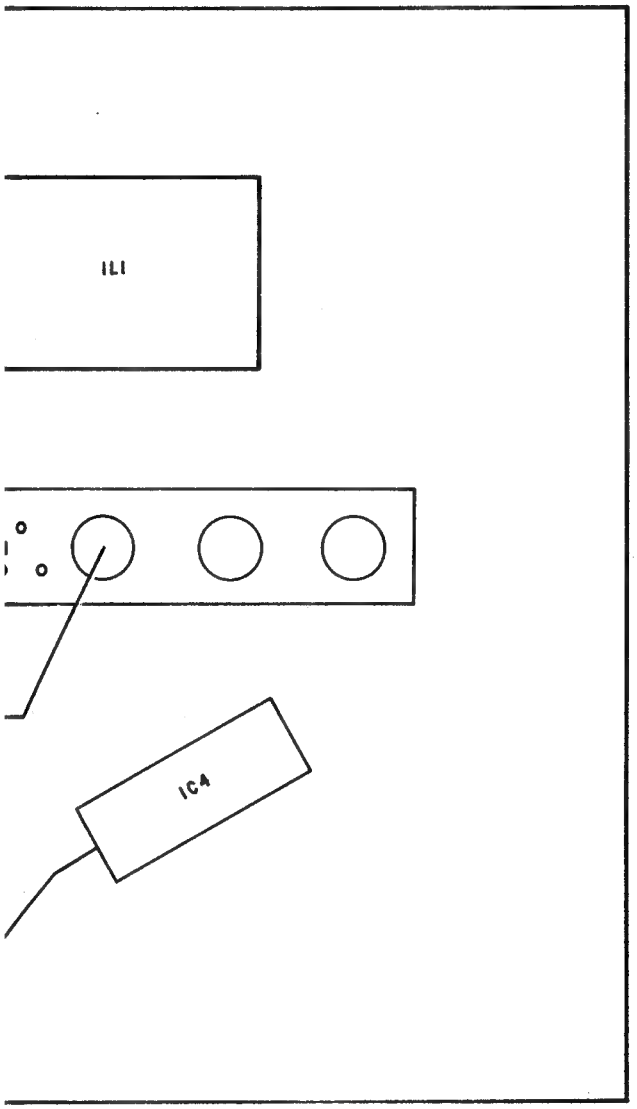


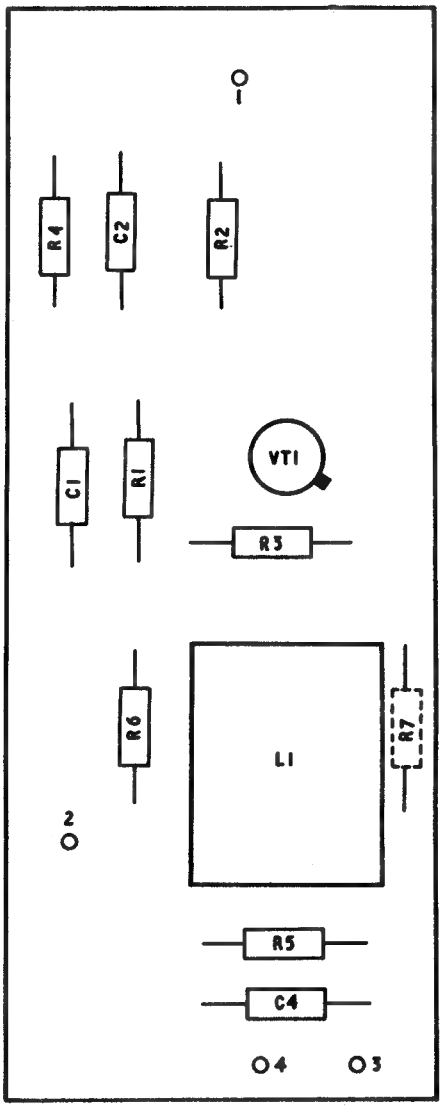


)DULE
)

Ist I.F. AMI
(BA

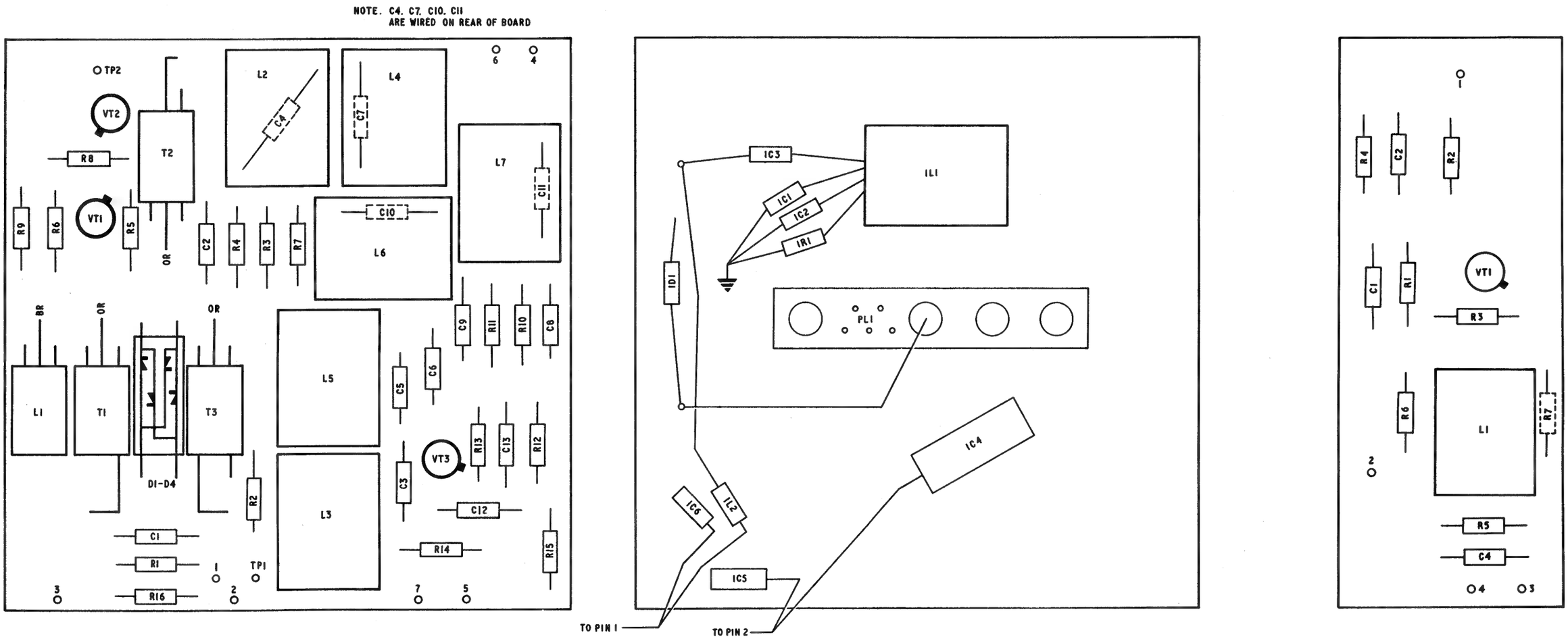
t: 3rd Mixer Module and Ist I.F. Amplifier Unit





1st I.F. AMPLIFIER UNIT
(BA 31474)

1st I.F. Amplifier Unit

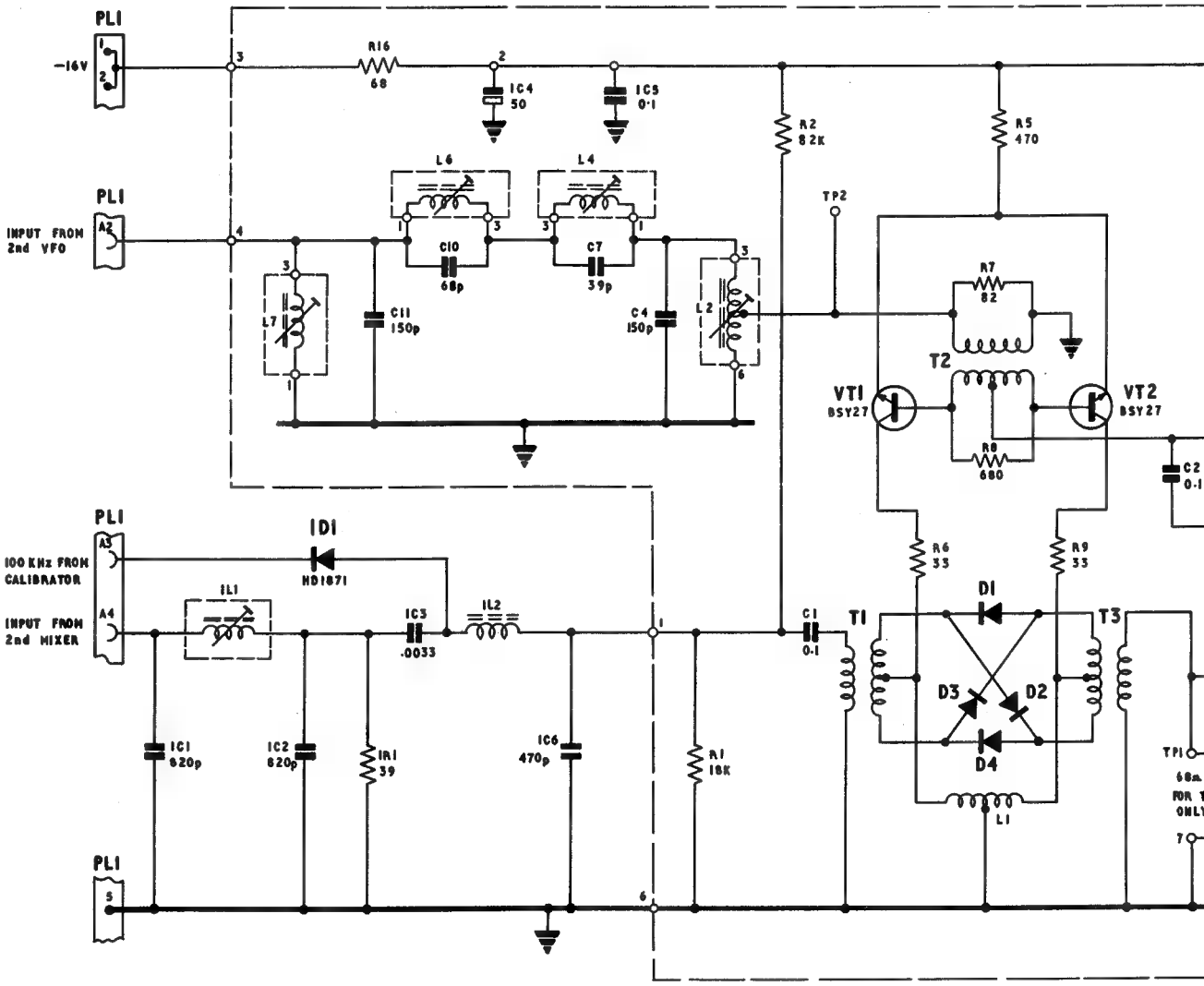


3rd MIXER MODULE
(BA 35966)

1st I.F. AMPLIFIER UNIT
(BA 31474)

Fig. L-11 Component Layout: 3rd Mixer Module and 1st I.F. Amplifier Unit

281/L-11



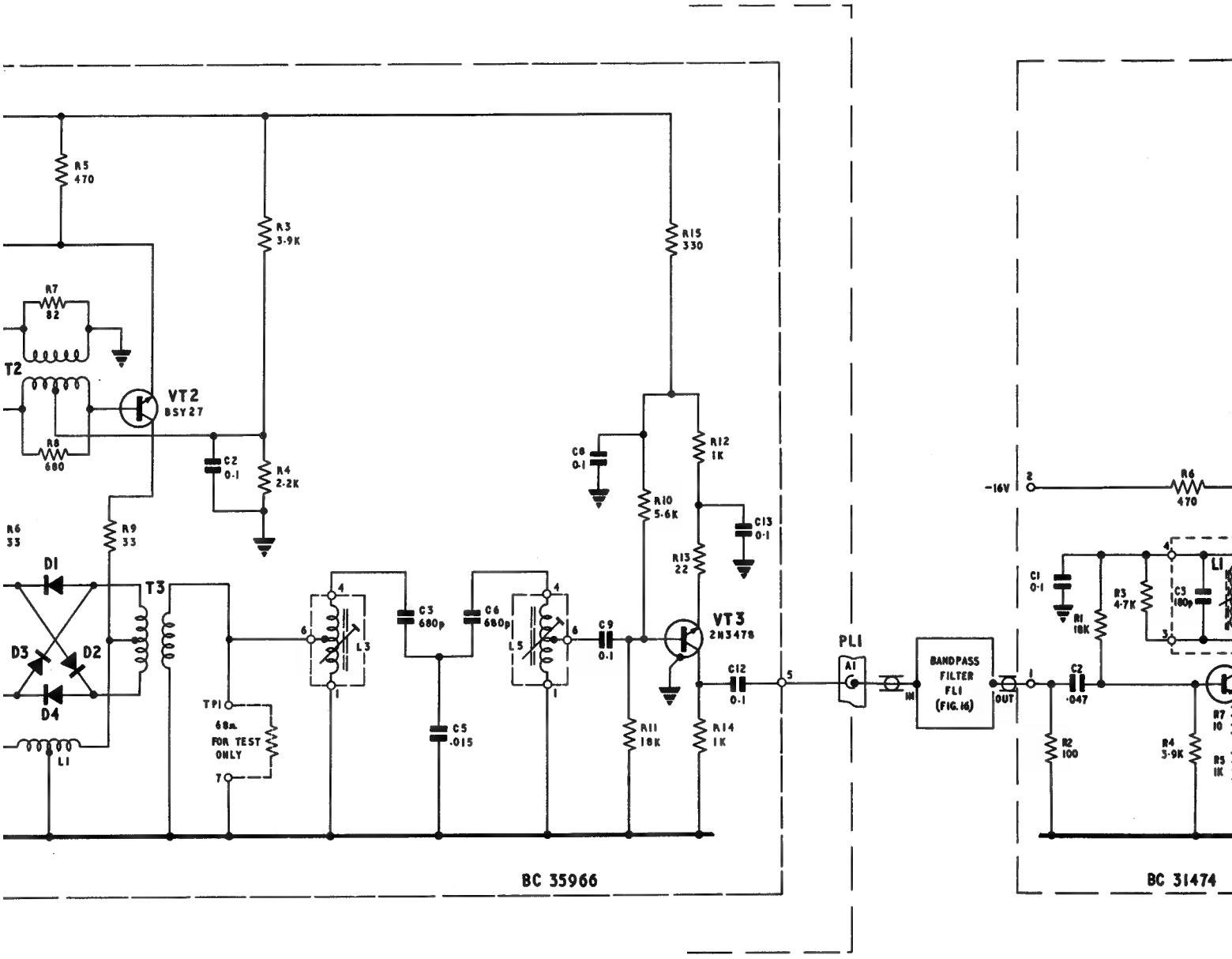
NOTE 1 COMPONENTS PREFIXED 'I' ARE MOUNTED ON THE MODULE BUT NOT ON THE CIRCUIT BOARD

2 ALL COIL CANS TO BE EARTHED

3rd Mixer Module

SC35970	281/11
1	5 6 7 9

Circuit : 3rd Mixer



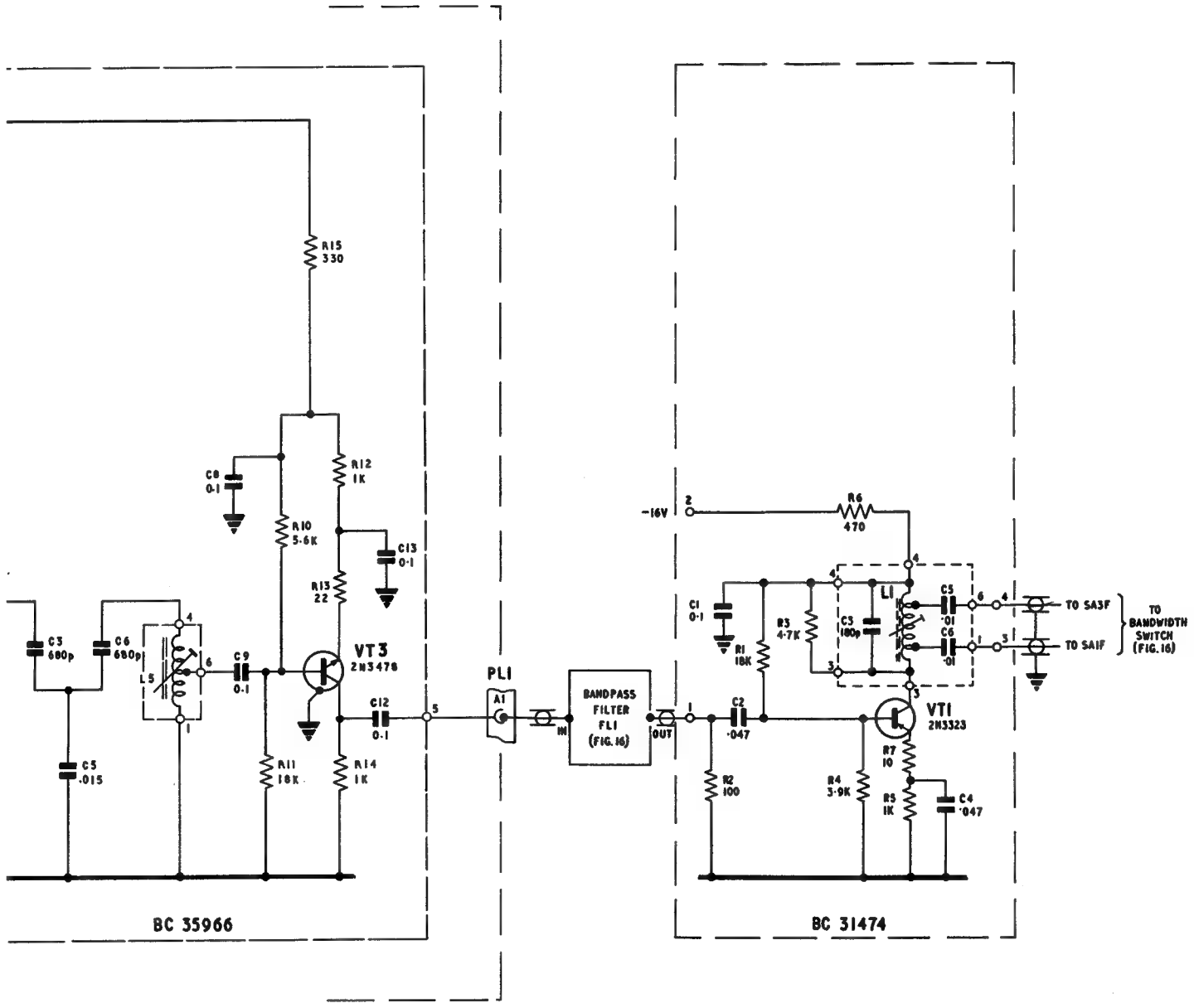
DUNTED ON THE MODULE
ARD

Module

1st I.F. Amplifier U

:uit : 3rd Mixer Module and 1st I.F. Amplifier Unit

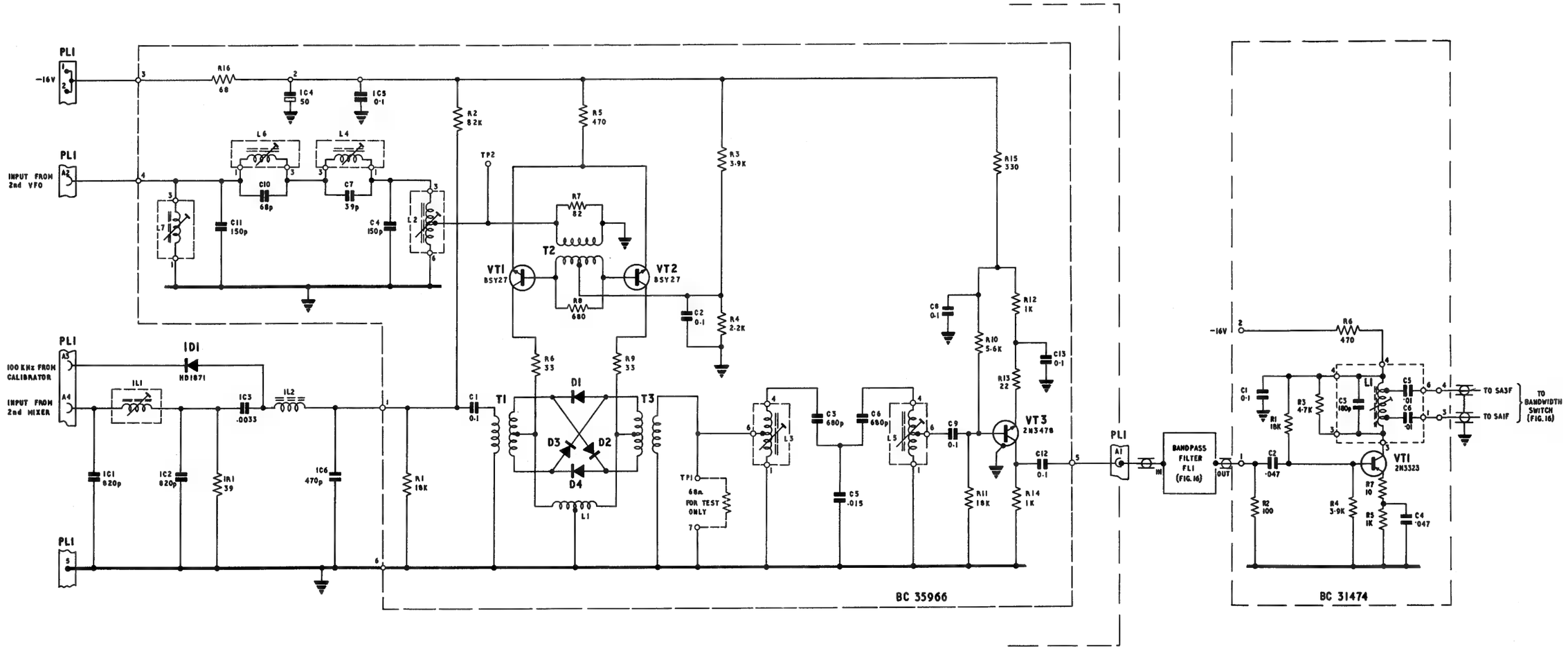
DC38450/ABCE	281/11
1 3 6	



1st I.F. Amplifier Unit

DC58450/ABCE	281/11
1 3 6	

Fig. 11



NOTE: 1 COMPONENTS PREFIXED 'I' ARE MOUNTED ON THE MODULE BUT NOT ON THE CIRCUIT BOARD

2 ALL COIL CANS TO BE EARTHED

3rd Mixer Module

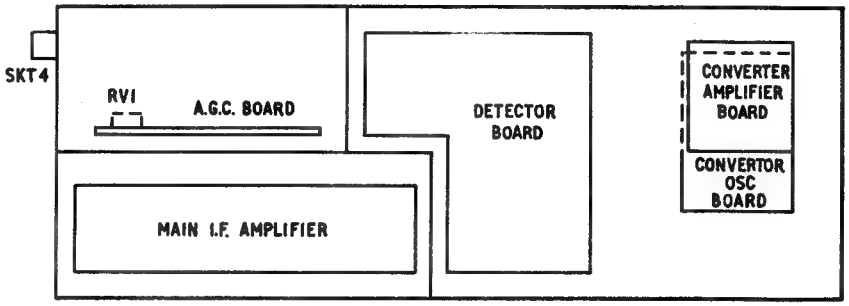
1st I.F. Amplifier Unit

BC35970	281/11
1	5 | 6 | 7 | 9

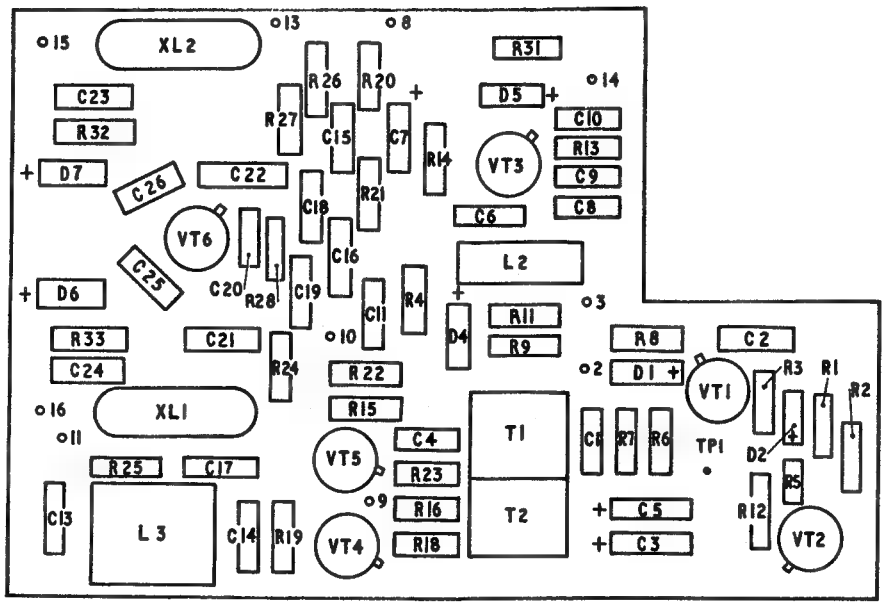
Circuit : 3rd Mixer Module and 1st I.F. Amplifier Unit

DC5B450/ABCE	281/11
1	5 | 6

Fig. 11

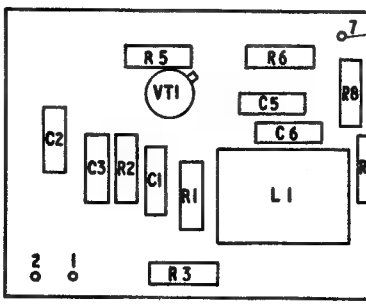


I.F. MODULE KEY DIAGRAM



DETECTOR BOARD

BA 28236



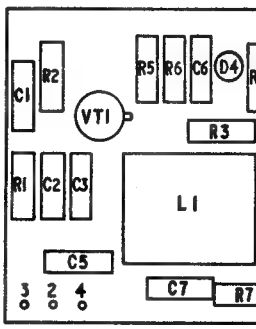
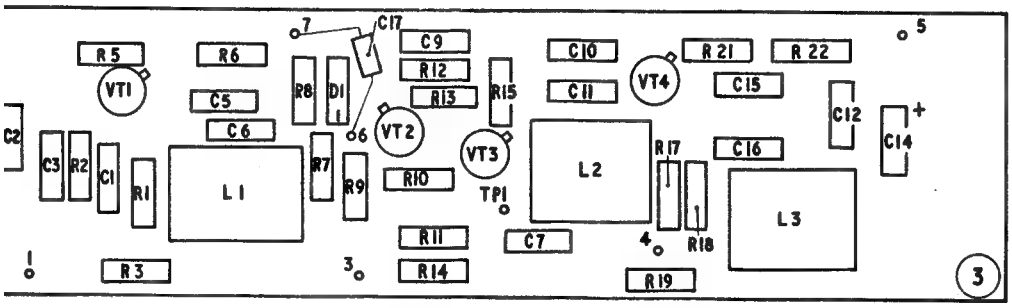


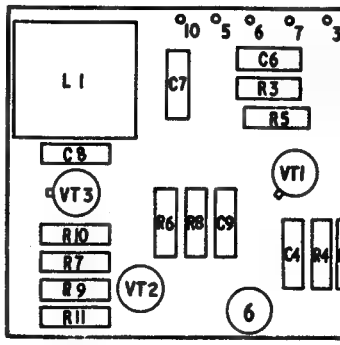
Fig. L-12

Component



MAIN I.F. AMPLIFIER BOARD

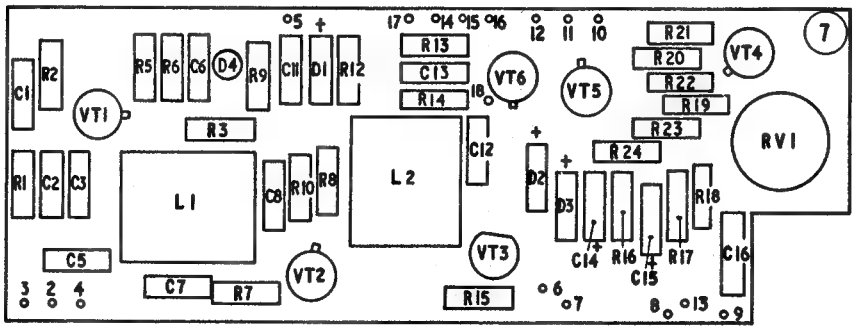
BA 30533



NOTE: THE 455kHz BOARD IS IDENT
THAT R10 IS OMITTED.

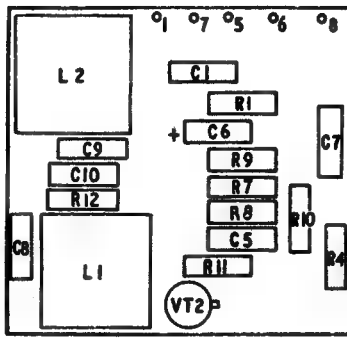
100kHz CONVERTER:A

BA 34783



A.G.C. BOARD

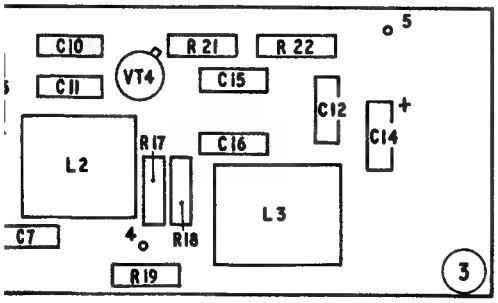
BA 31466/B



CONVERTER: OSCILLA

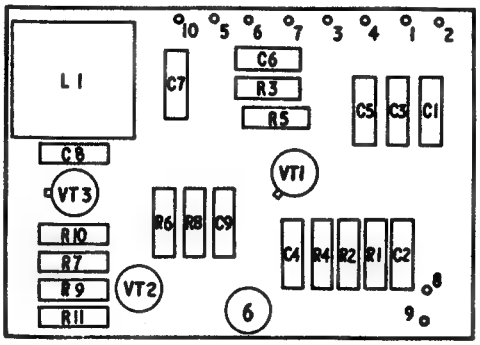
BA 3856

Component Layout : I.F. Module



'LIFIER BOARD

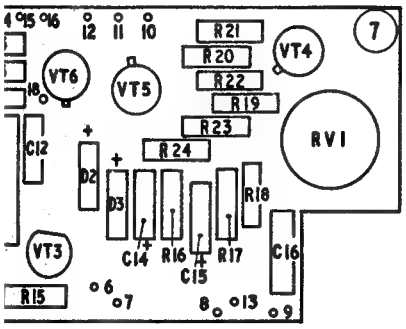
30533



NOTE: THE 455kHz BOARD IS IDENTICAL EXCEPT THAT R10 IS OMITTED.

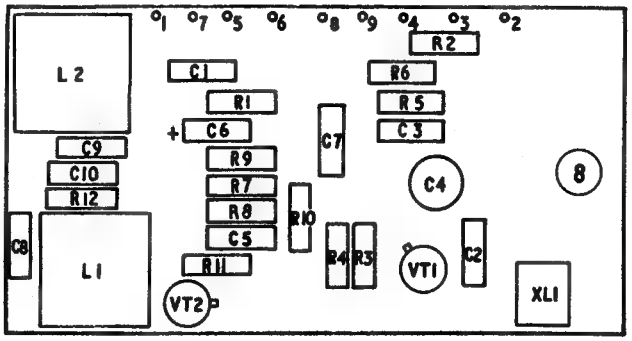
100kHz CONVERTER:AMPLIFIER

BA 34783



)ARD

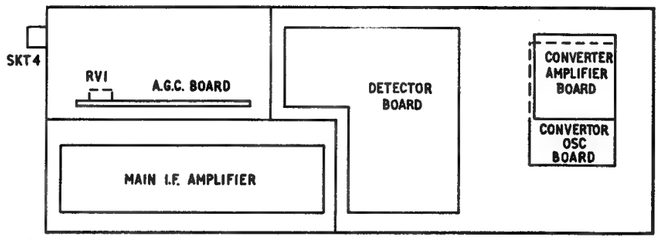
:66/B



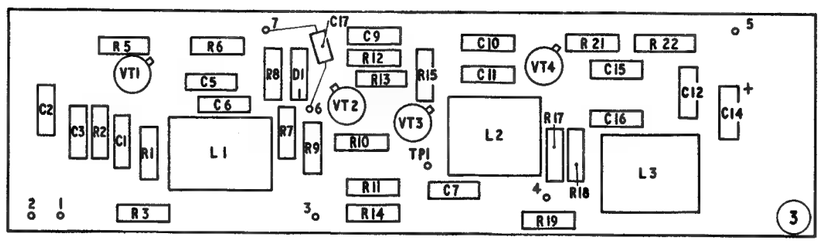
CONVERTER: OSCILLATOR AND MIXER

BA 38568

.F. Module

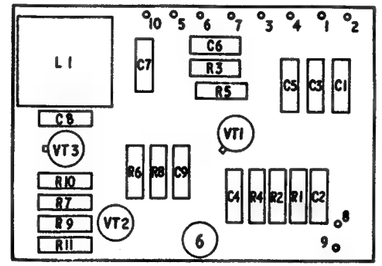


I.F. MODULE KEY DIAGRAM



MAIN I.F. AMPLIFIER BOARD

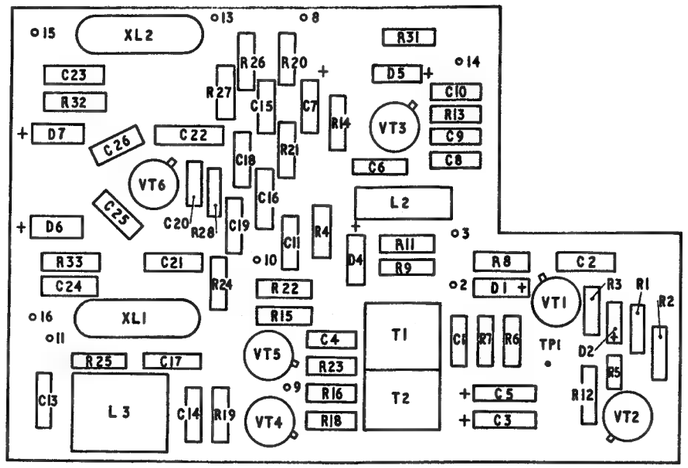
BA 30533



NOTE: THE 455kHz BOARD IS IDENTICAL EXCEPT THAT R10 IS OMITTED.

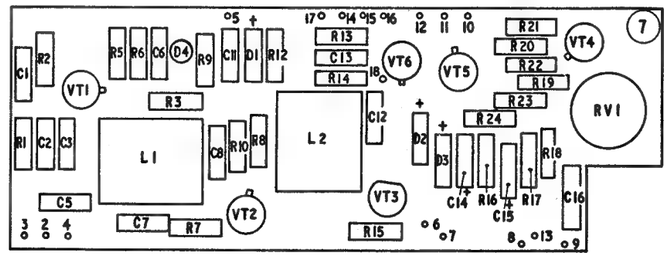
100kHz CONVERTER:AMPLIFIER

BA 34783



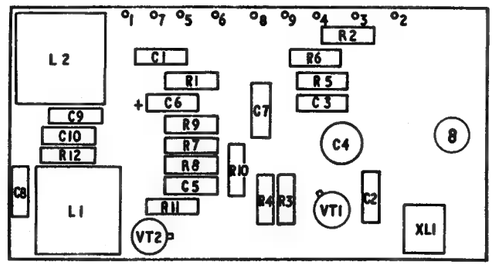
DETECTOR BOARD

BA 28236



A.G.C. BOARD

BA 31466/B

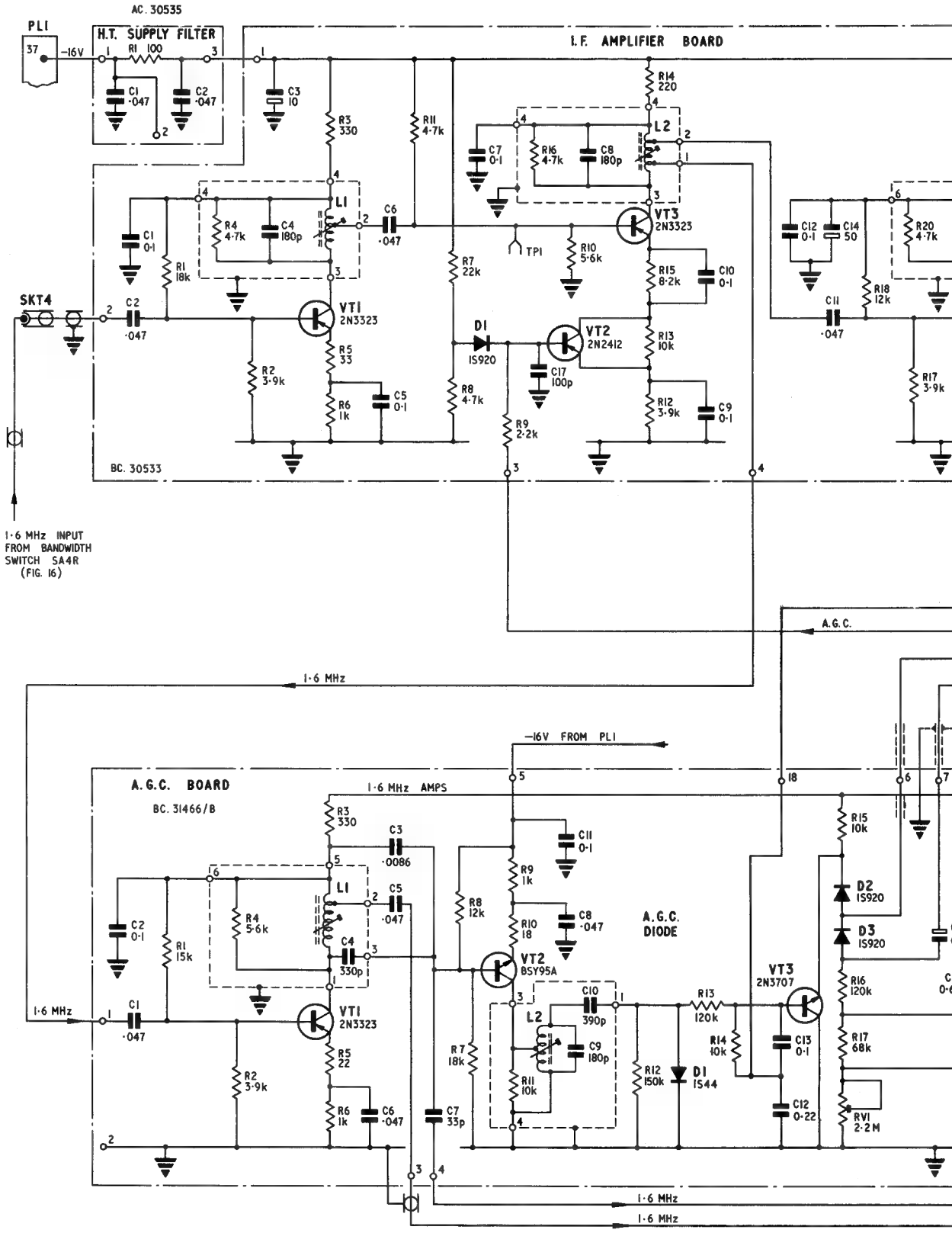


CONVERTER : OSCILLATOR AND MIXER

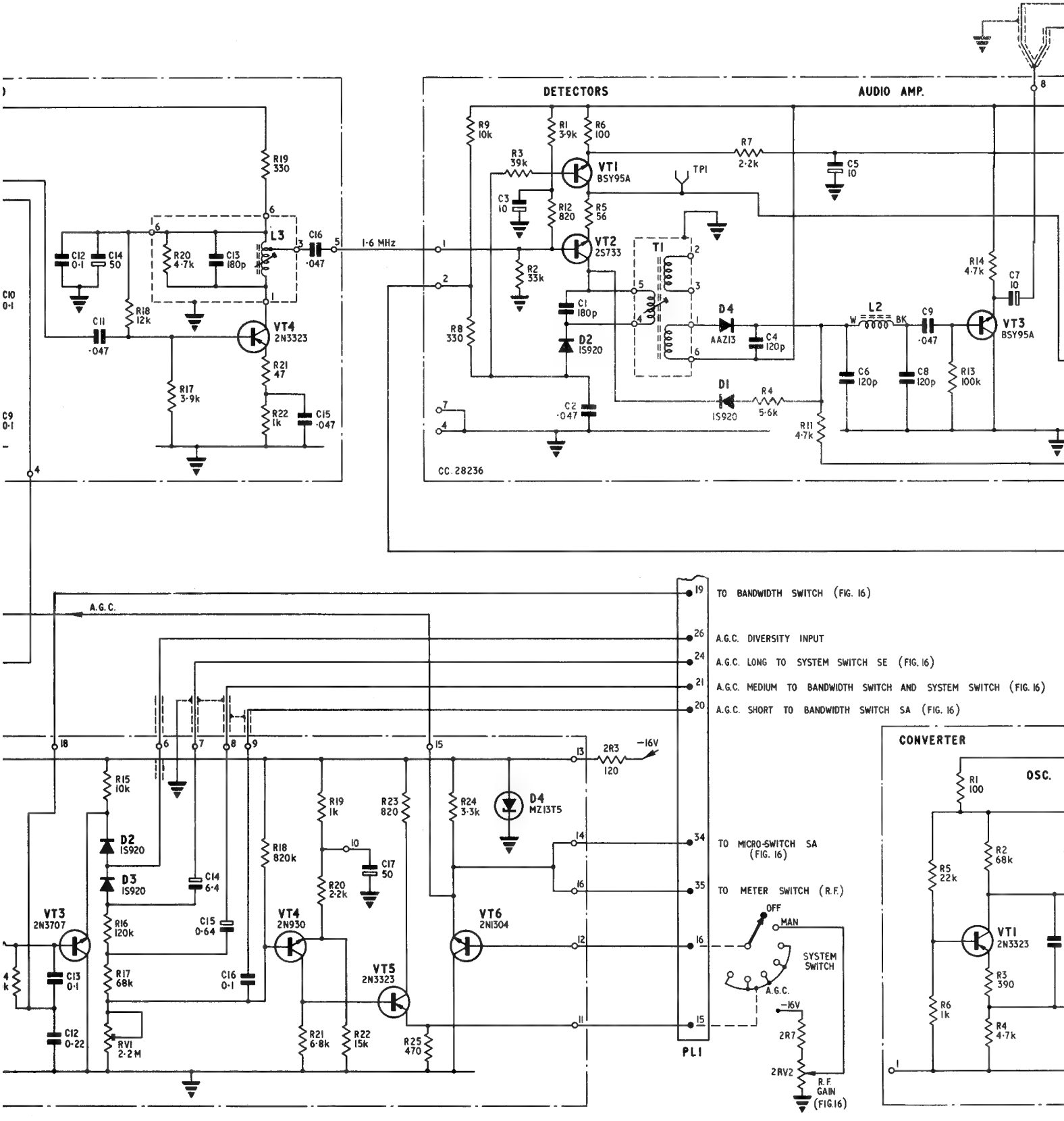
BA 38568

Fig. L-12

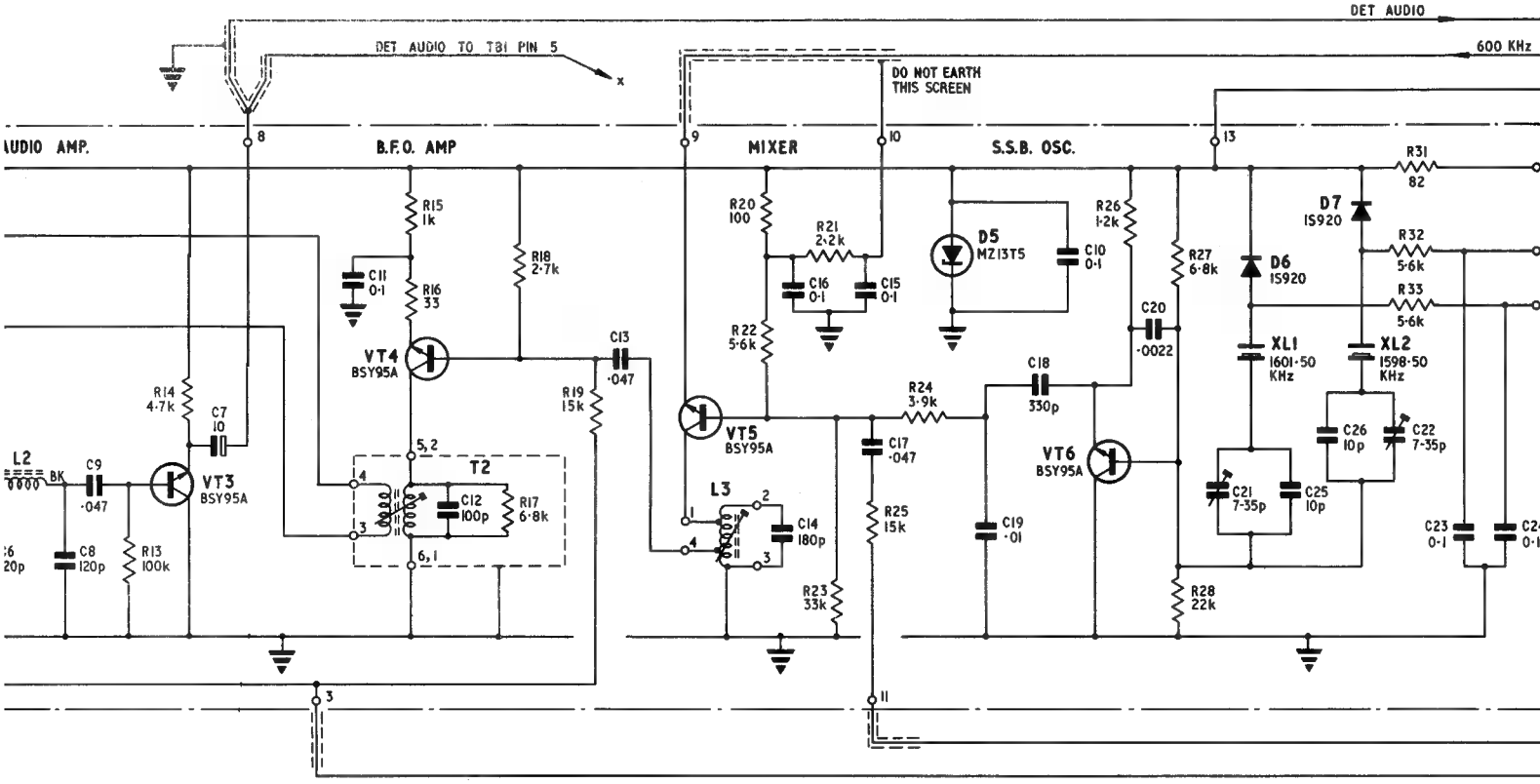
Component Layout : I.F. Module

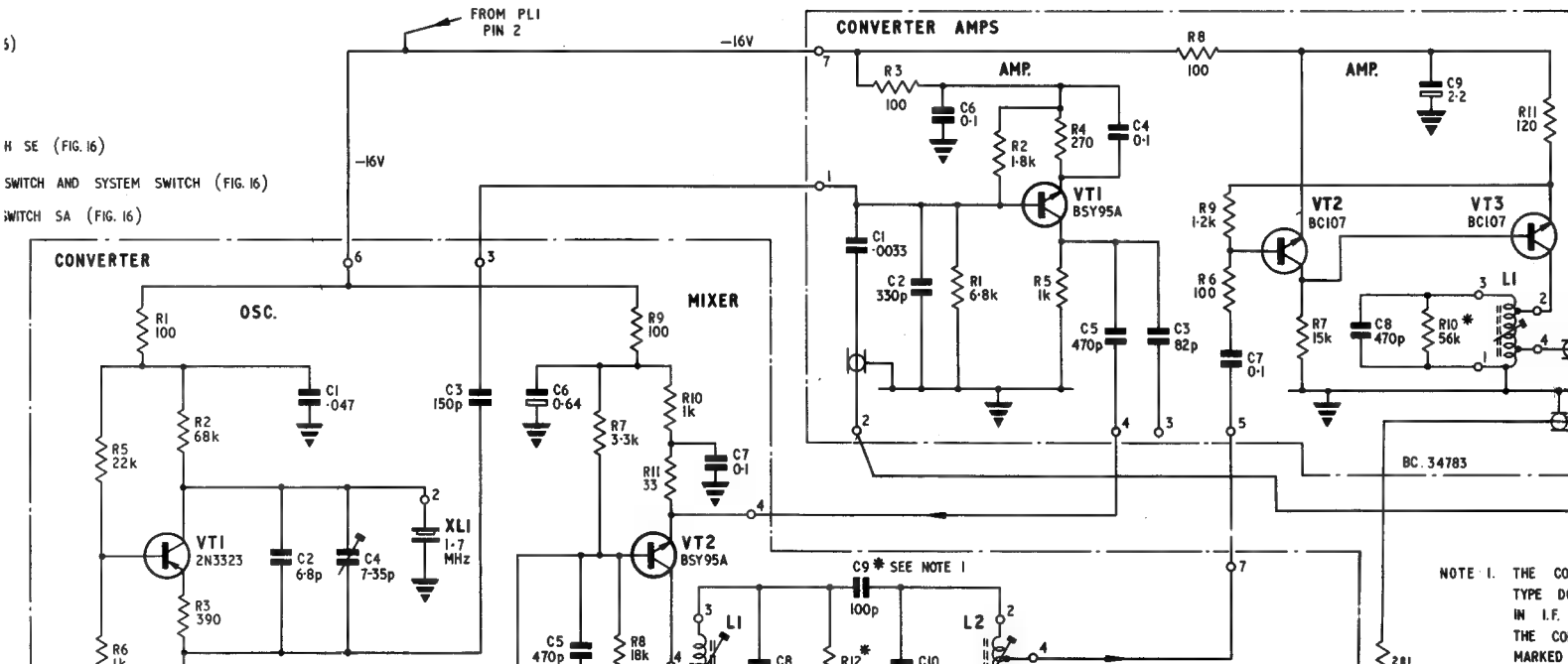


DC.38580	281/12
1 3 4 5 6 7	

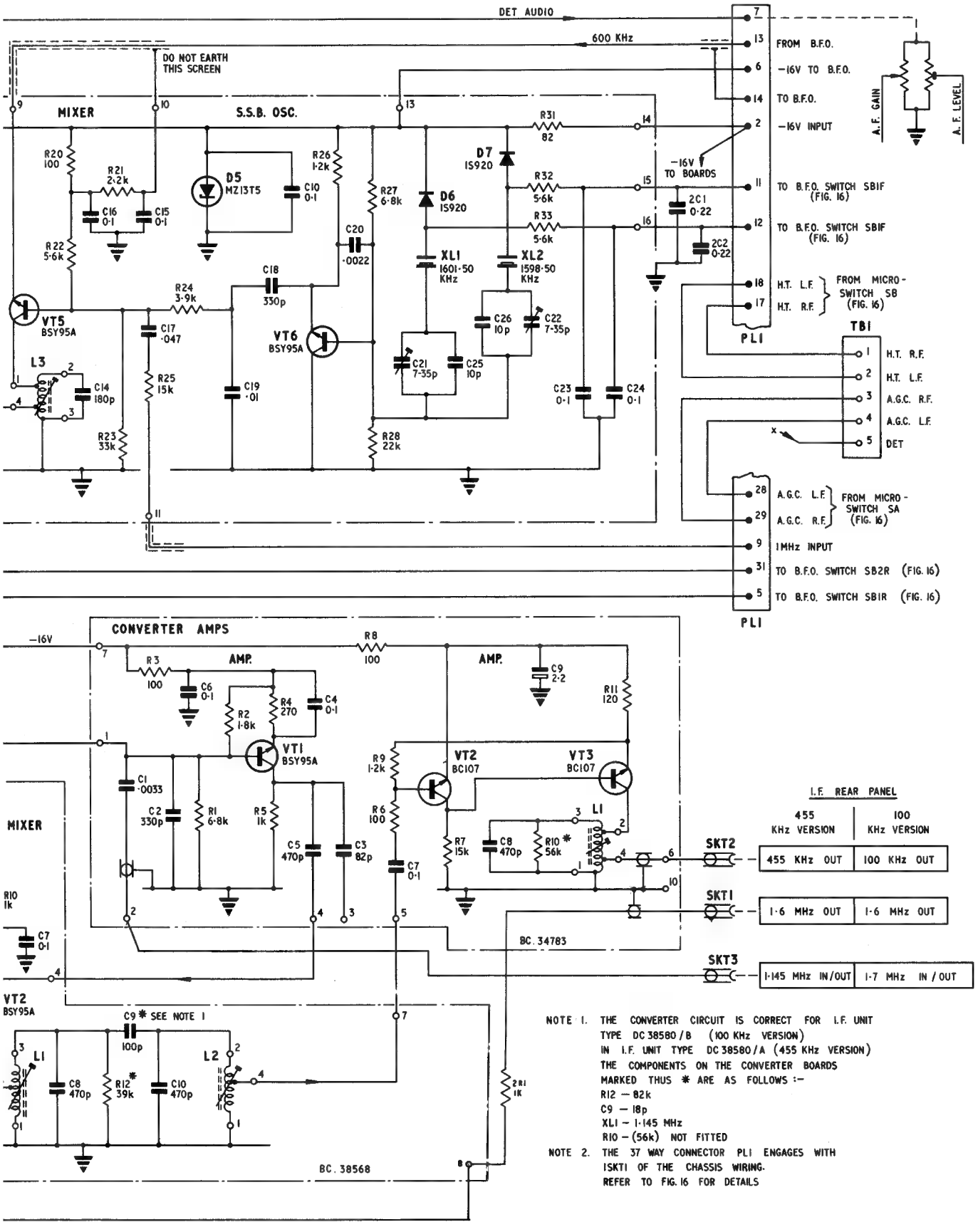


Circuit : I.F. Module


DET AUDIO
600 KHz
DET AUDIO TO T81 PIN 5
DO NOT EARTH THIS SCREEN
AUDIO AMP.
B.F.O. AMP
MIXER
S.S.B. OSC.
VT4 BSY95A
VT5 BSY95A
VT6 BSY95A
VT3 BSY95A
T2
L3
D5 MZ13T5
D6 IS920
D7 IS920
XL1 1601·50 KHz
XL2 1598·50 KHz


FROM PL1 PIN 2
-16V
CONVERTER AMPS
AMP.
AMP.
VT1 BSY95A
VT2 BC107
VT3 BC107
CONVERTER
OSC.
MIXER
VT1 2N3323
VT2 BSY95A
XL1 1·7 MHz
L1
L2
BC. 34783
BC. 38568
NOTE 1. THE CO
TYPE D
IN I.F.
THE CO
MARKED
R12 — 8
C9 — 18
XL1 — 1·
R10 — (5
NOTE 2. THE 37
ISKTI
REFER

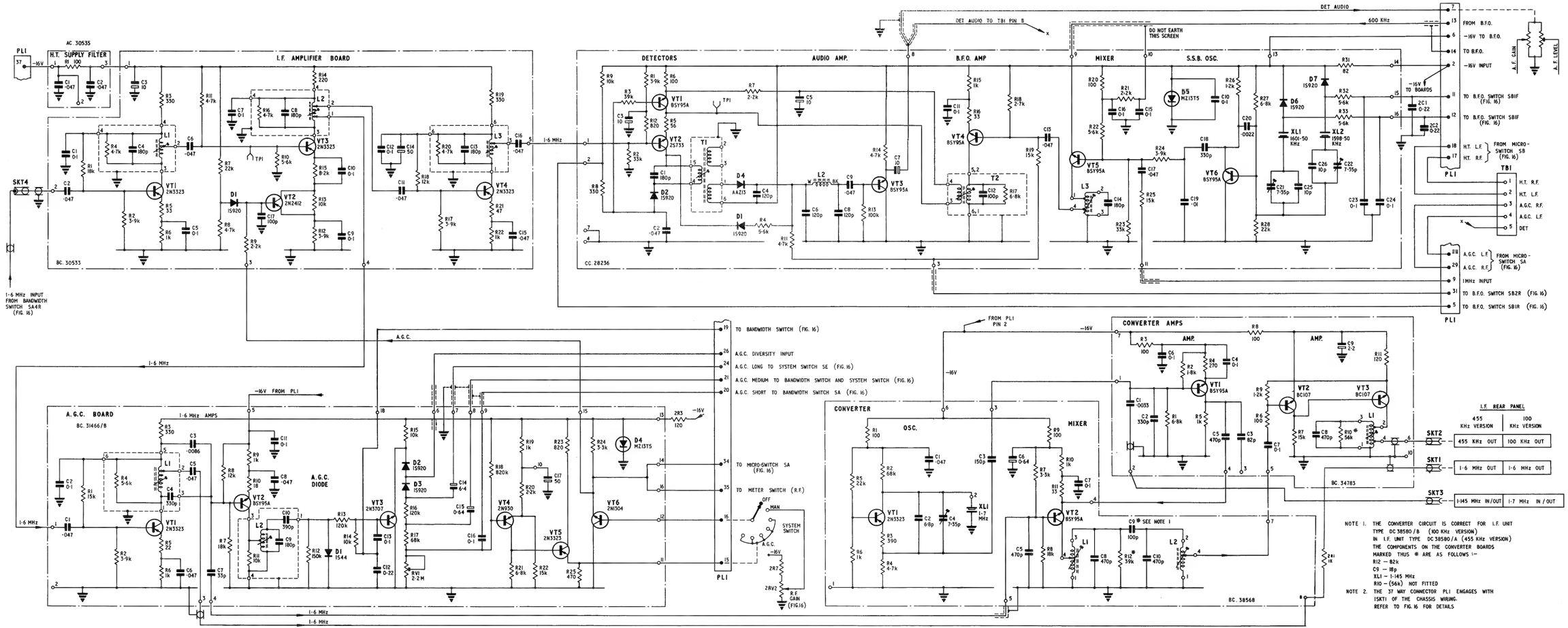
odule



NOTE 1. THE CONVERTER CIRCUIT IS CORRECT FOR I.F. UNIT TYPE DC 38580/B (100 KHz VERSION) IN I.F. UNIT TYPE DC 38580/A (455 KHz VERSION) THE COMPONENTS ON THE CONVERTER BOARDS MARKED THUS * ARE AS FOLLOWS :-
R12 — 82k
C9 — 18p
XL1 — 1·145 MHz
R10 — (56k) NOT FITTED

NOTE 2. THE 37 WAY CONNECTOR PL1 ENGAGES WITH ISKT1 OF THE CHASSIS WIRING. REFER TO FIG. 16 FOR DETAILS

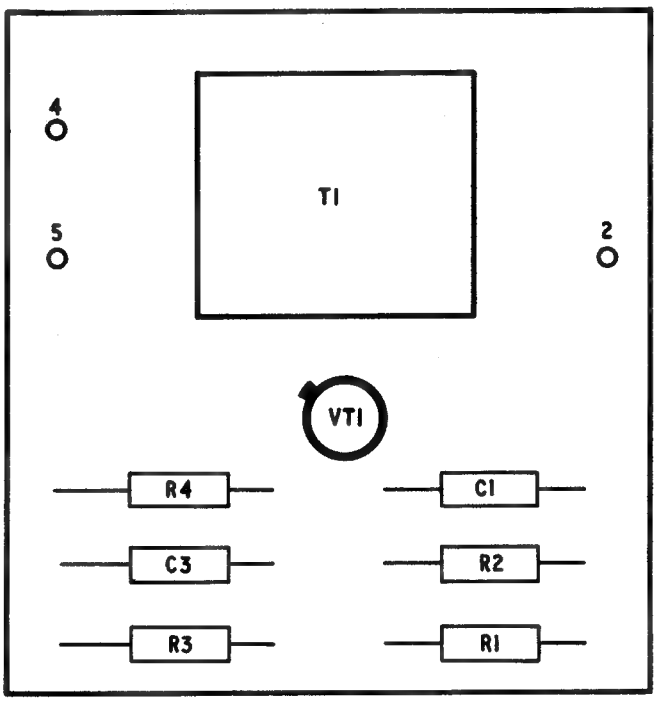
Fig. 12



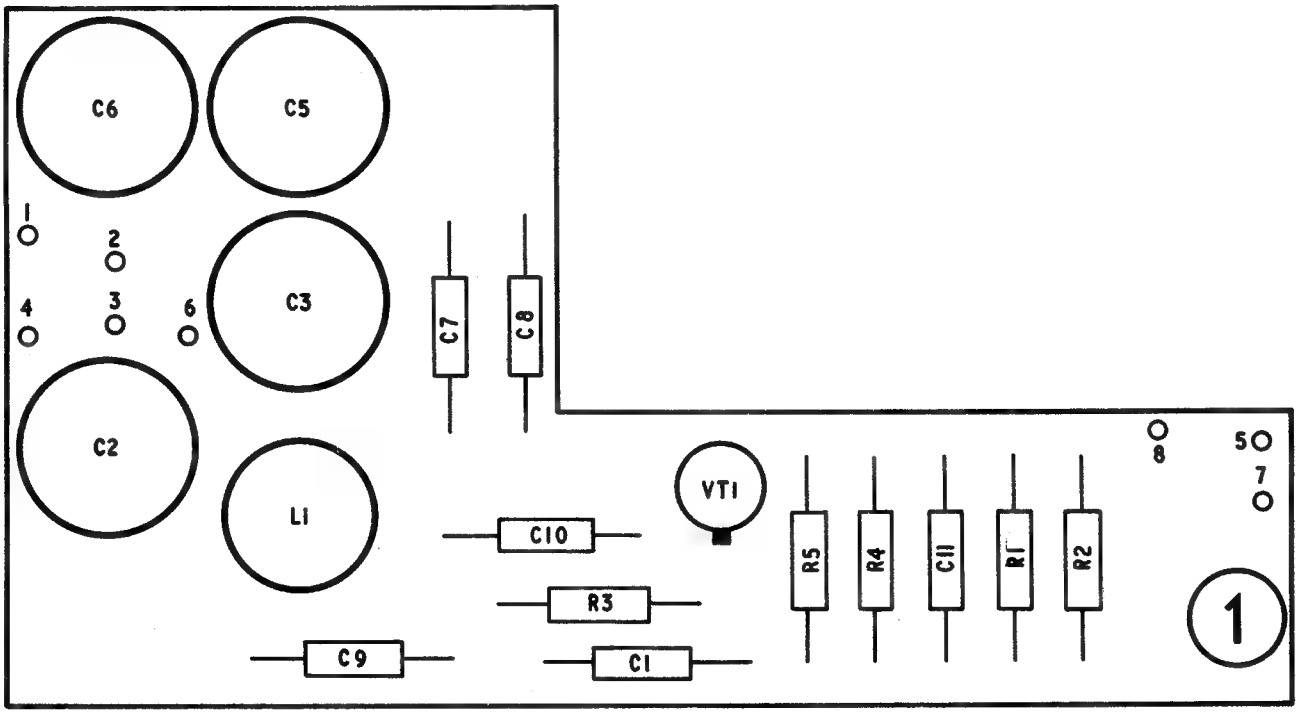
Circuit : I.F. Module

Fig. 12

DC.38580 | 281/12
1 | 3 | 4 | 5 | 6 | 7



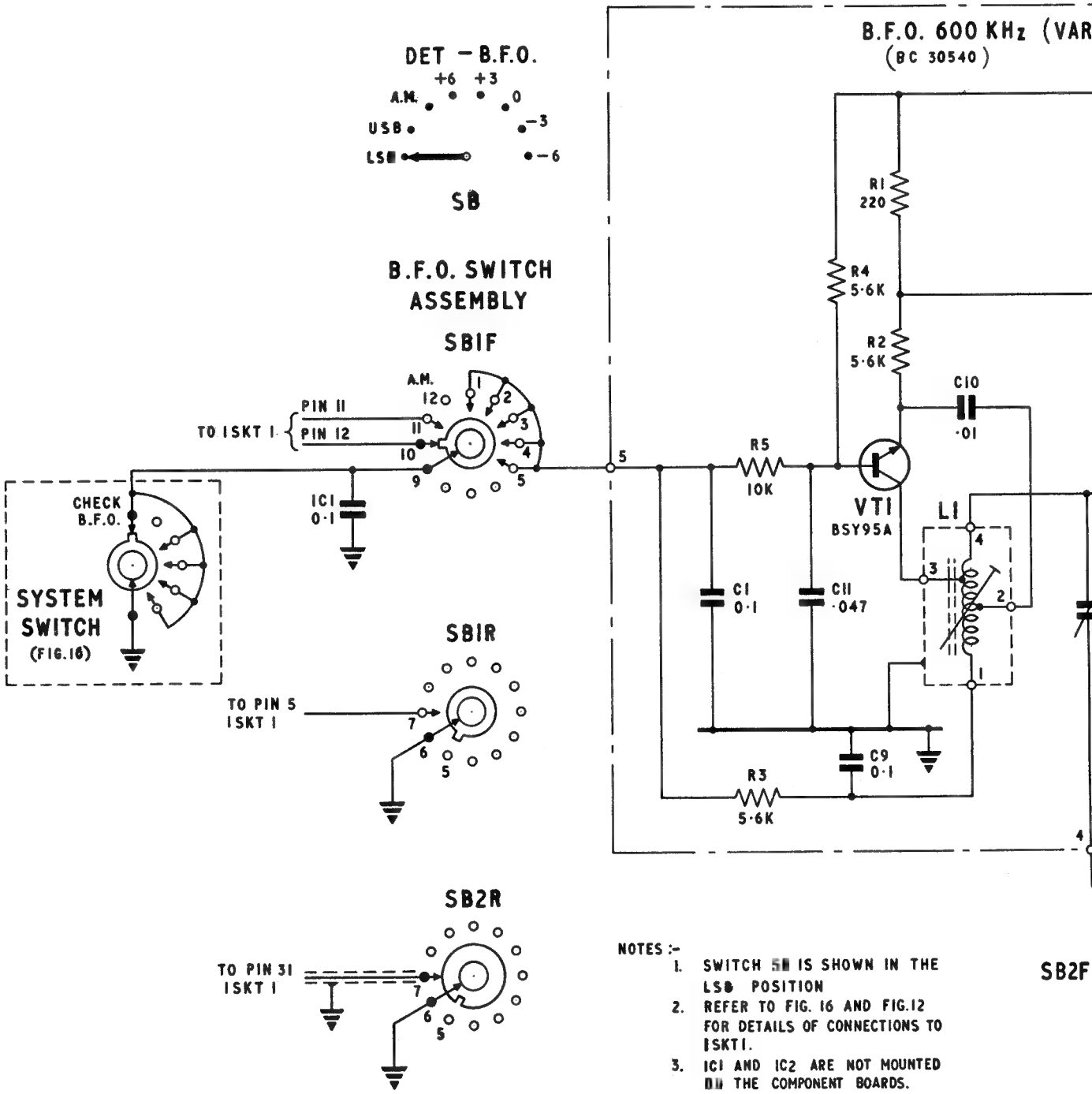
B.F.O. Amplifier
(B.A.30542)



600KHz Oscillator
(BA.30540)

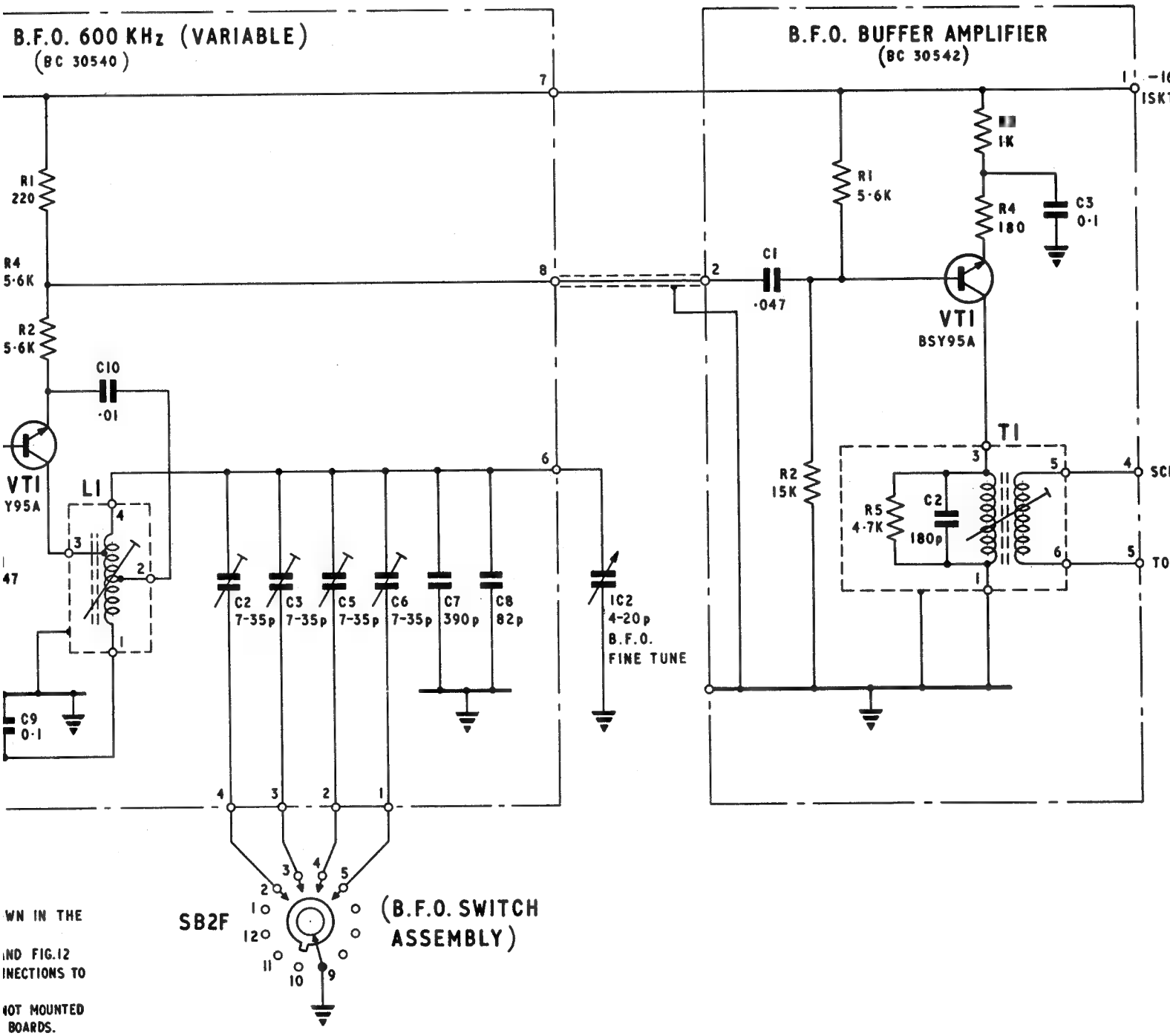
Fig. L-13 Component Layout B.F.O.

281/L-13

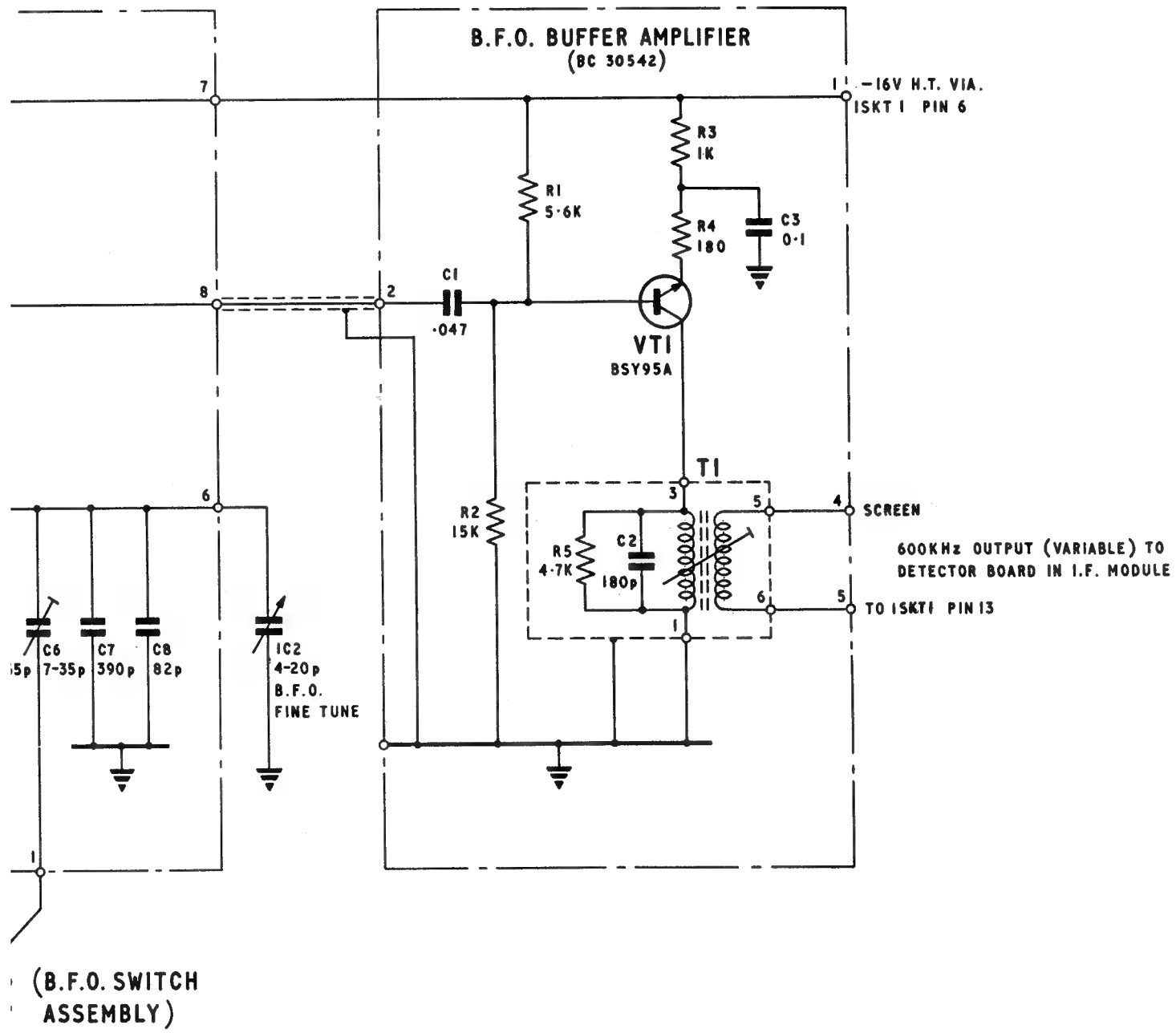


NOTES :-

1. SWITCH SB IS SHOWN IN THE LSB POSITION
2. REFER TO FIG. 16 AND FIG.12 FOR DETAILS OF CONNECTIONS TO ISKT1.
3. IC1 AND IC2 ARE NOT MOUNTED ON THE COMPONENT BOARDS.

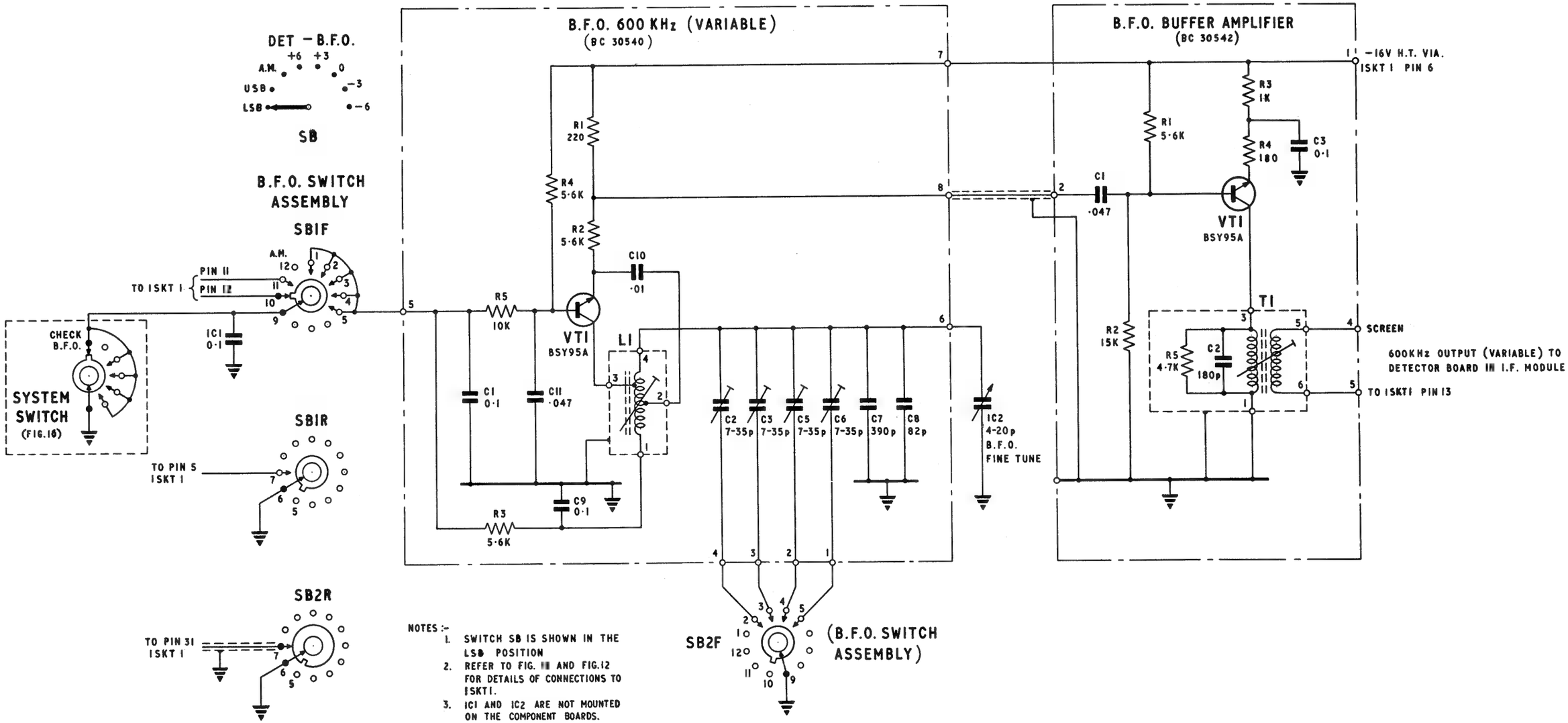


Circuit : B.F.O. Unit



F.O. Unit

Fig.13



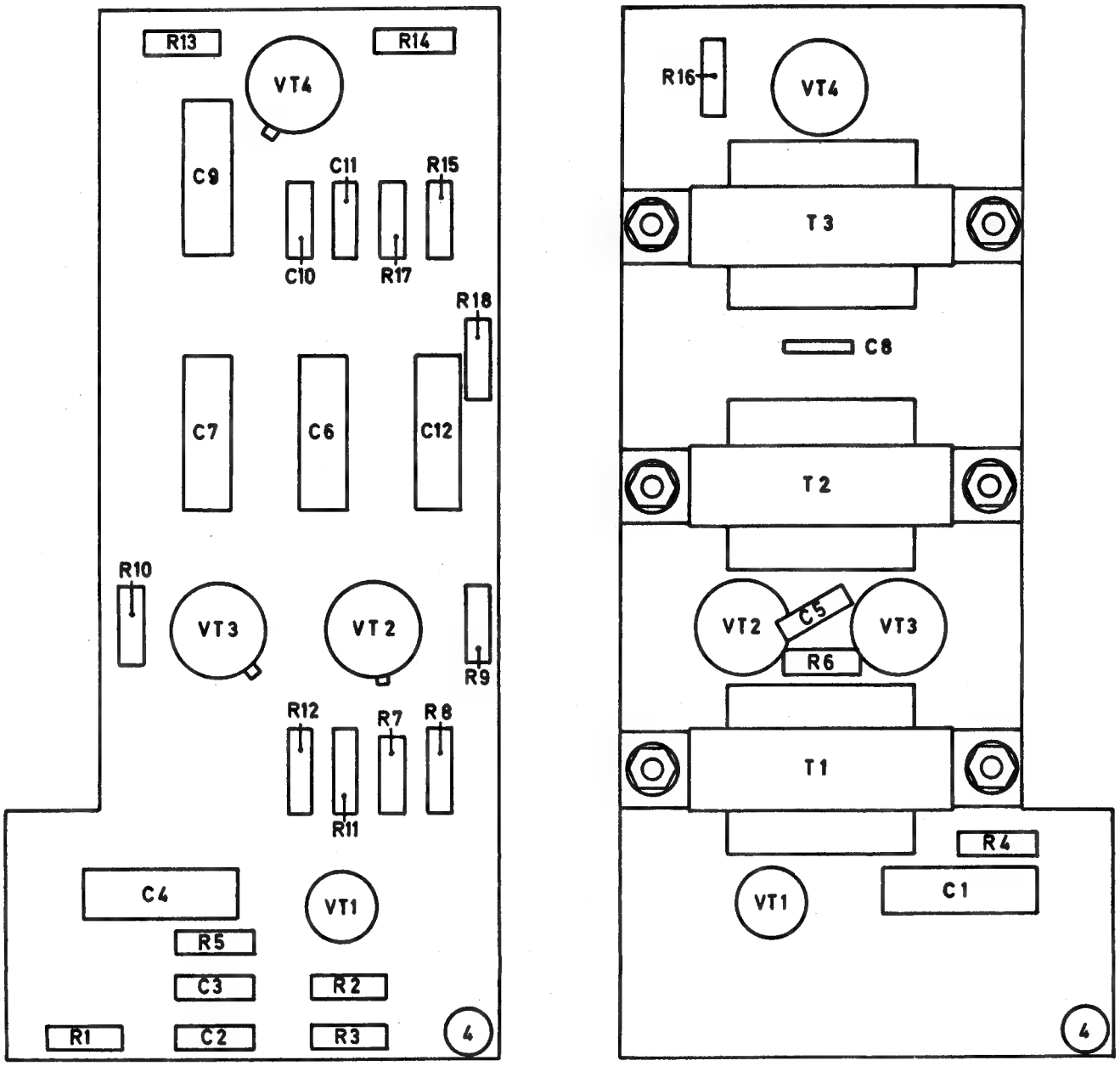
NOTES :-

1. SWITCH SB IS SHOWN IN THE LSB POSITION
2. REFER TO FIG. 11 AND FIG.12 FOR DETAILS OF CONNECTIONS TO ISKT1.
3. IC1 AND IC2 ARE NOT MOUNTED ON THE COMPONENT BOARDS.

DC38450 / ABCE	281/13
1 3 6	

Circuit : B.F.O. Unit

Fig.13

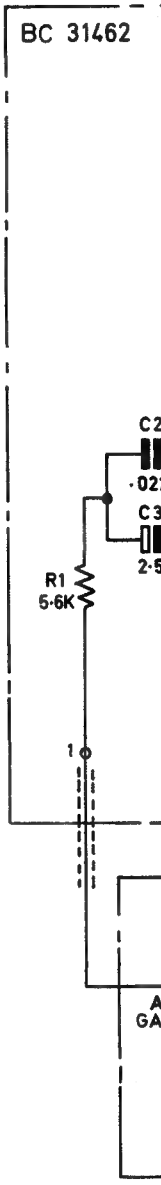


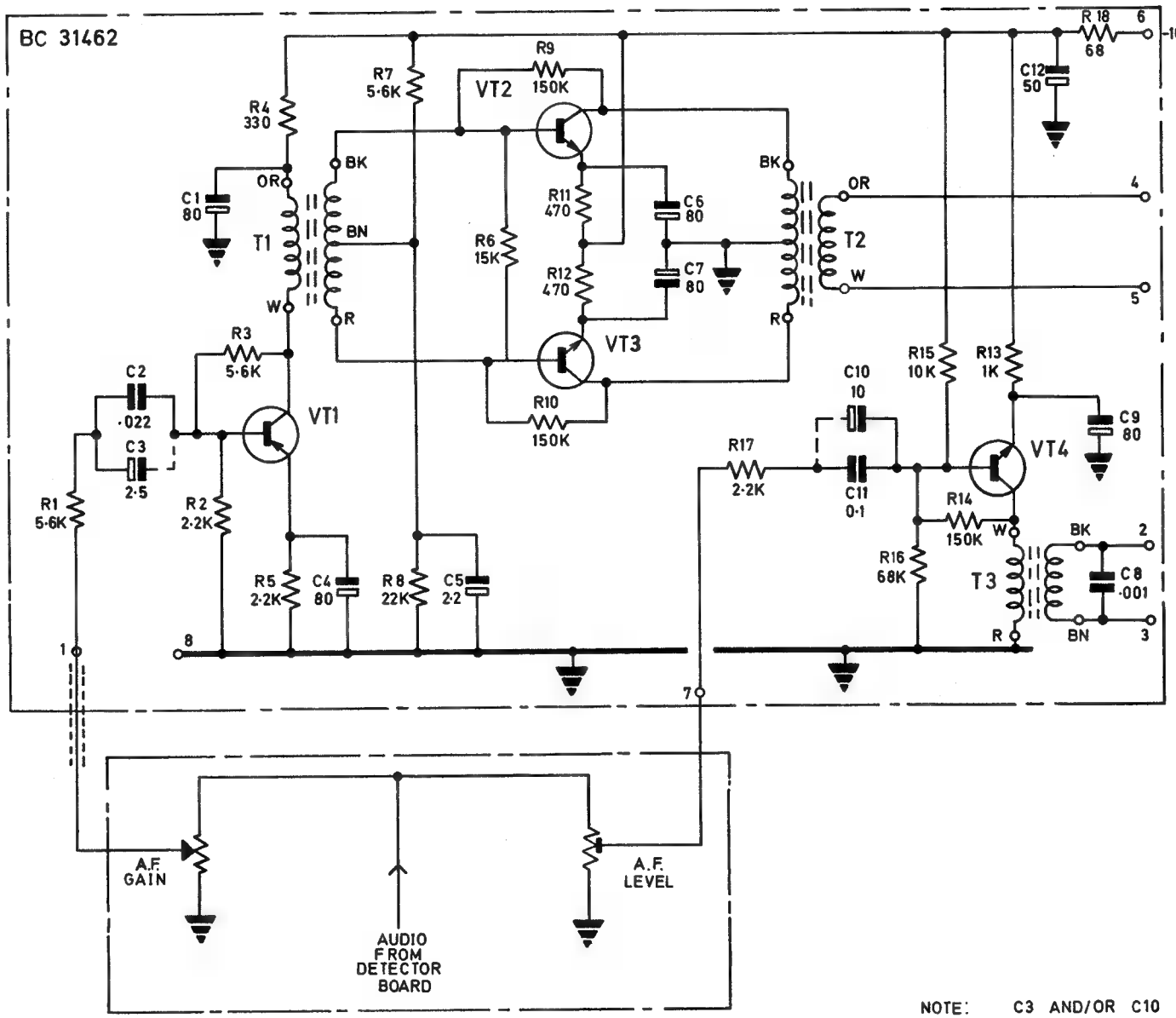
BA 31462

Fig. L-14a

Component Layout
10mW Audio Amplifier Board

281/L-14a


BC 31462
C2
·02
C3
2·5
R1
5·6K
1
A
GA

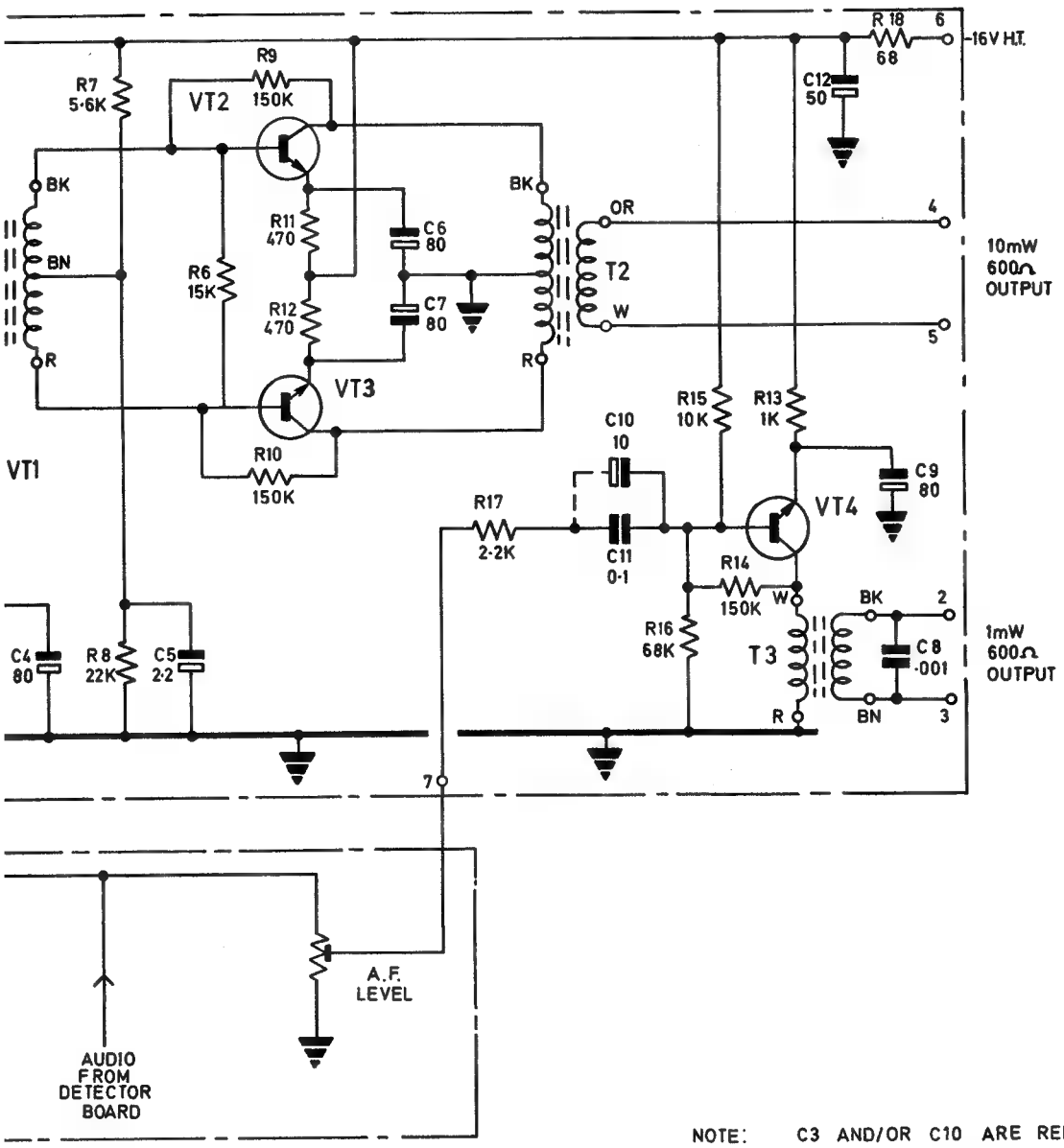


NOTE: C3 AND/OR C10 ARE AS SHOWN TO PROVID ATTENUATION IN THE AMPLIFIER

DC38450/ABCE	281/14a
6 7	

Circuit 10mW Audio Amplifier Board

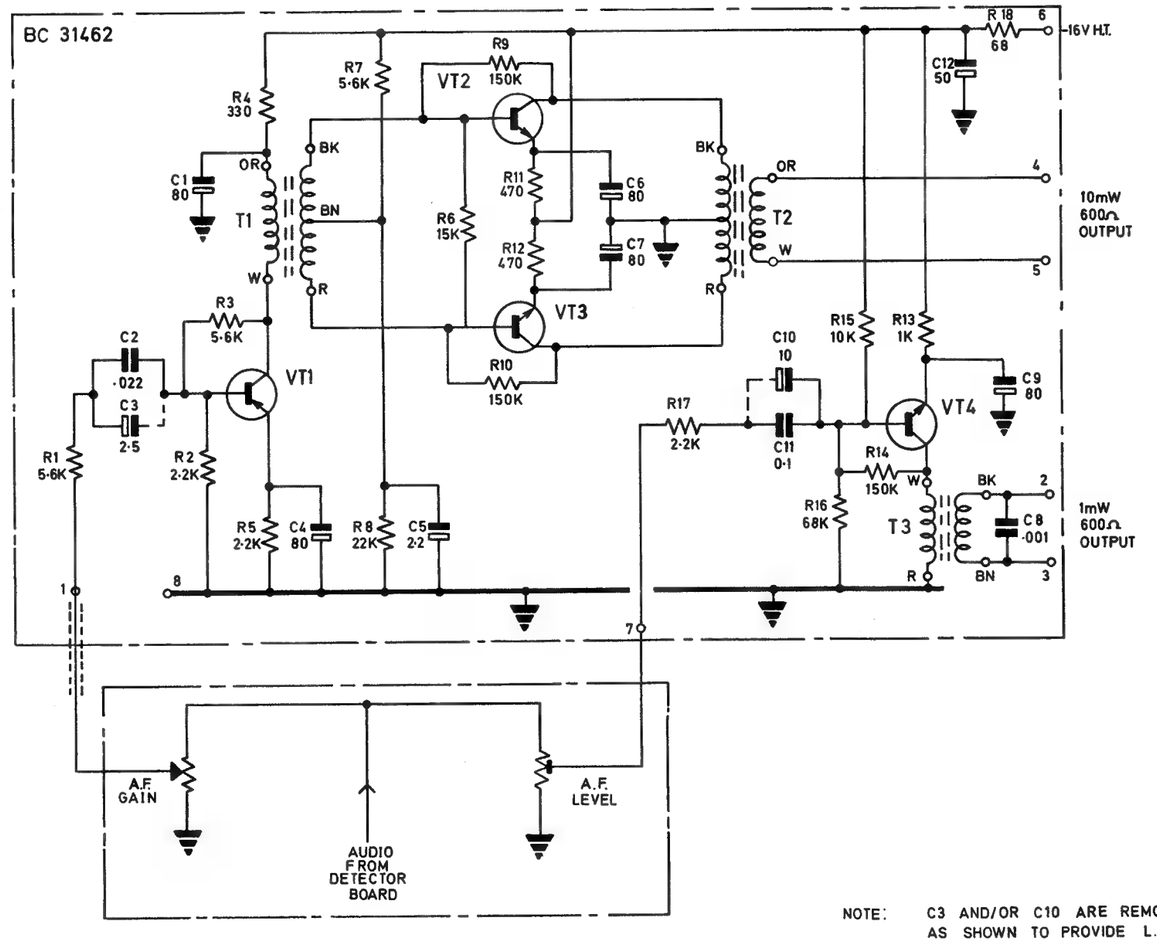
Fig



NOTE: C3 AND/OR C10 ARE REMOVED AS SHOWN TO PROVIDE L.F. ATTENUATION IN THE AUDIO AMPLIFIER

Circuit 10mW Audio Amplifier Board

Fig.14a

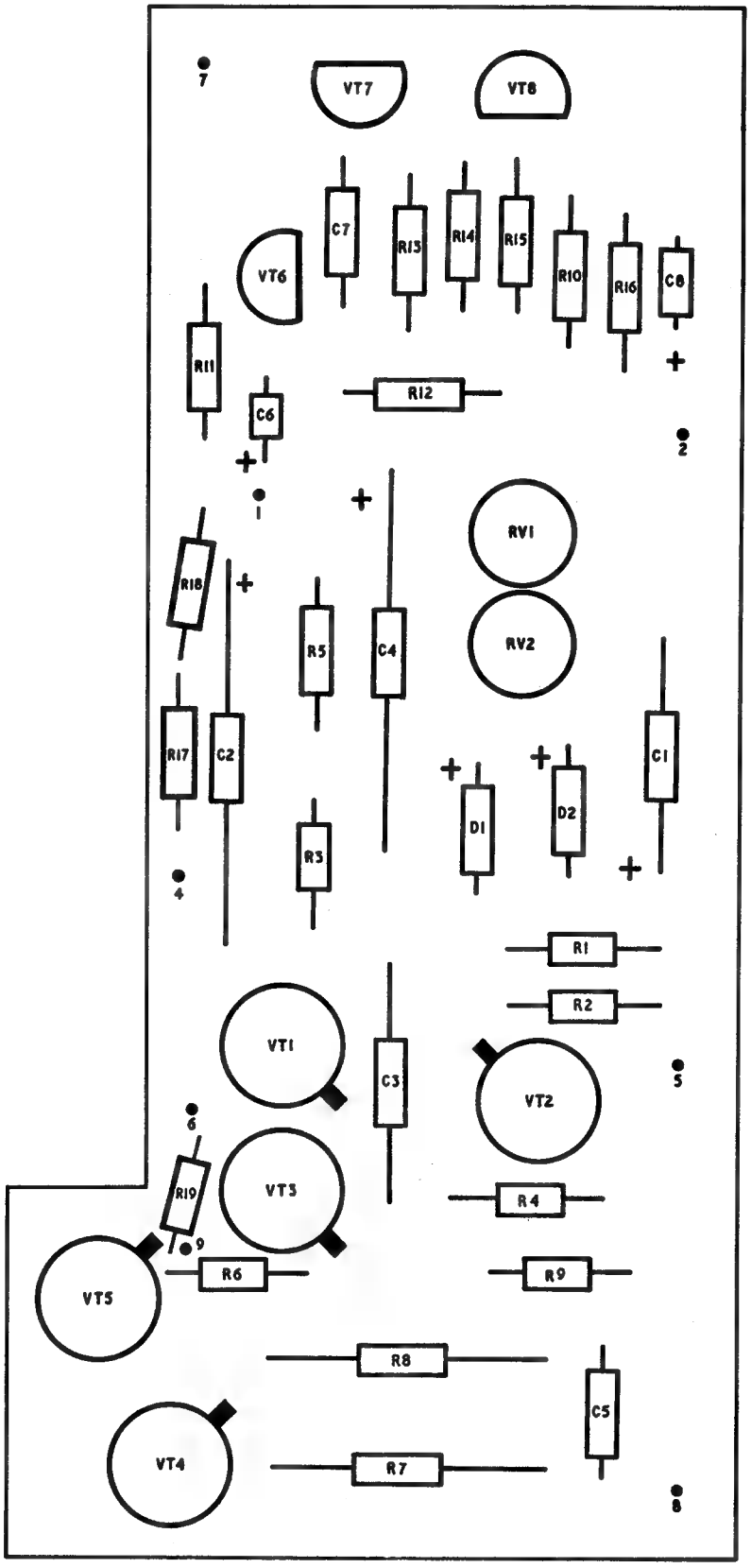


NOTE: C3 AND/OR C10 ARE REMOVED AS SHOWN TO PROVIDE L.F. ATTENUATION IN THE AUDIO AMPLIFIER

DC38450/ABCE	281/14a
6	7

Circuit 10mW Audio Amplifier Board

Fig.14a

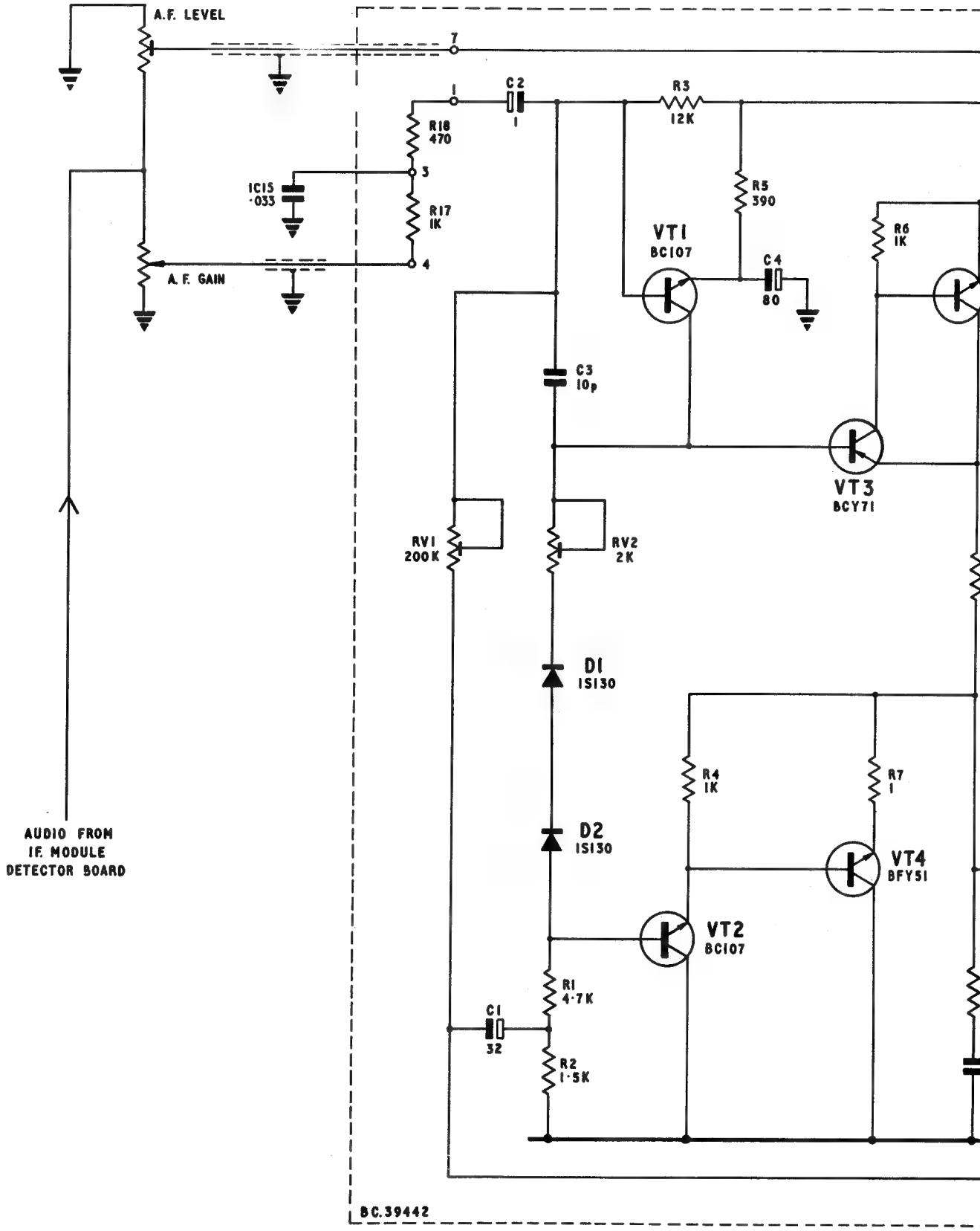


BA 39442

Fig. L-14 b

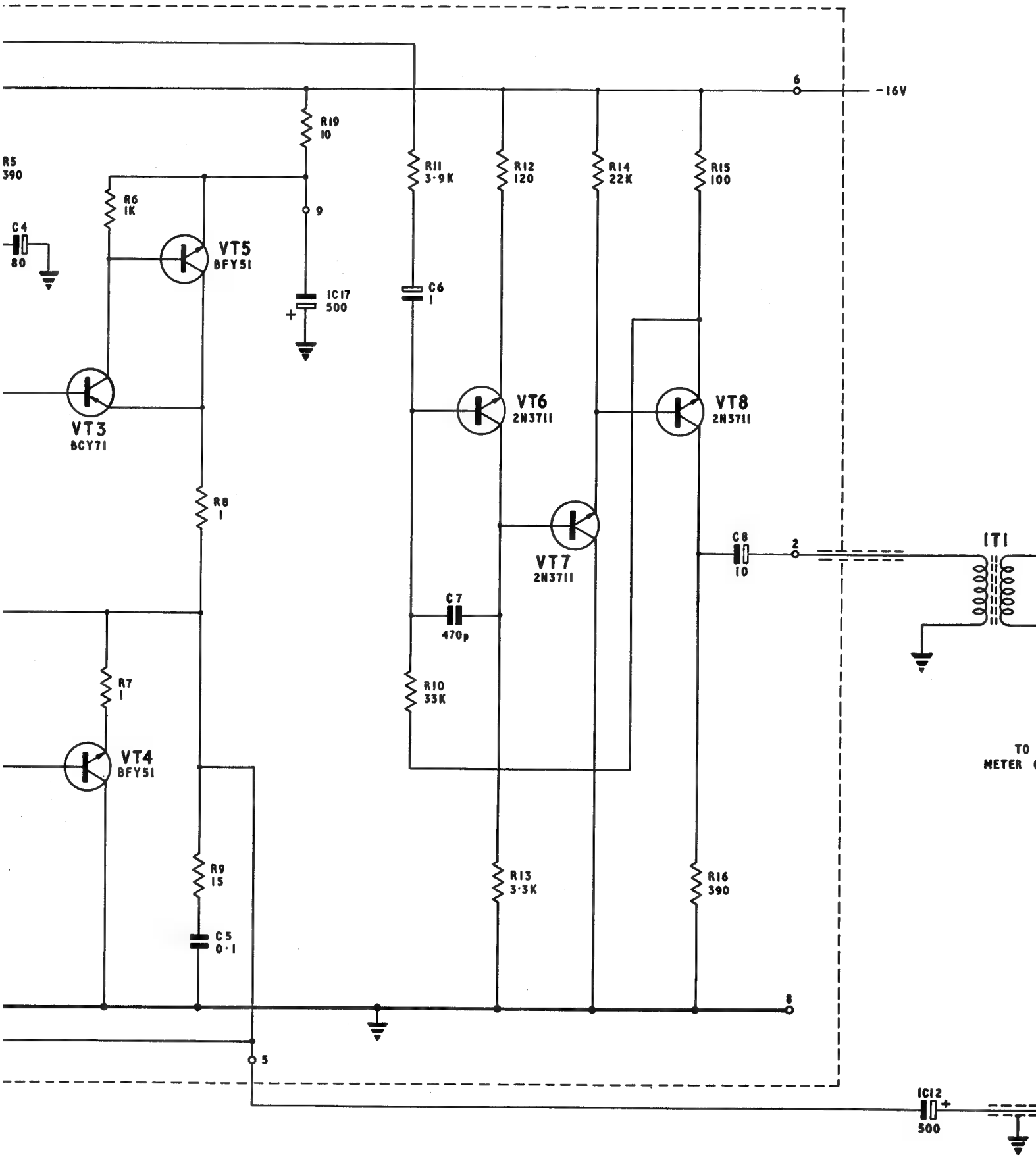
Component Layout: Audio Amplifier Board (1 Watt)

281/L-14b

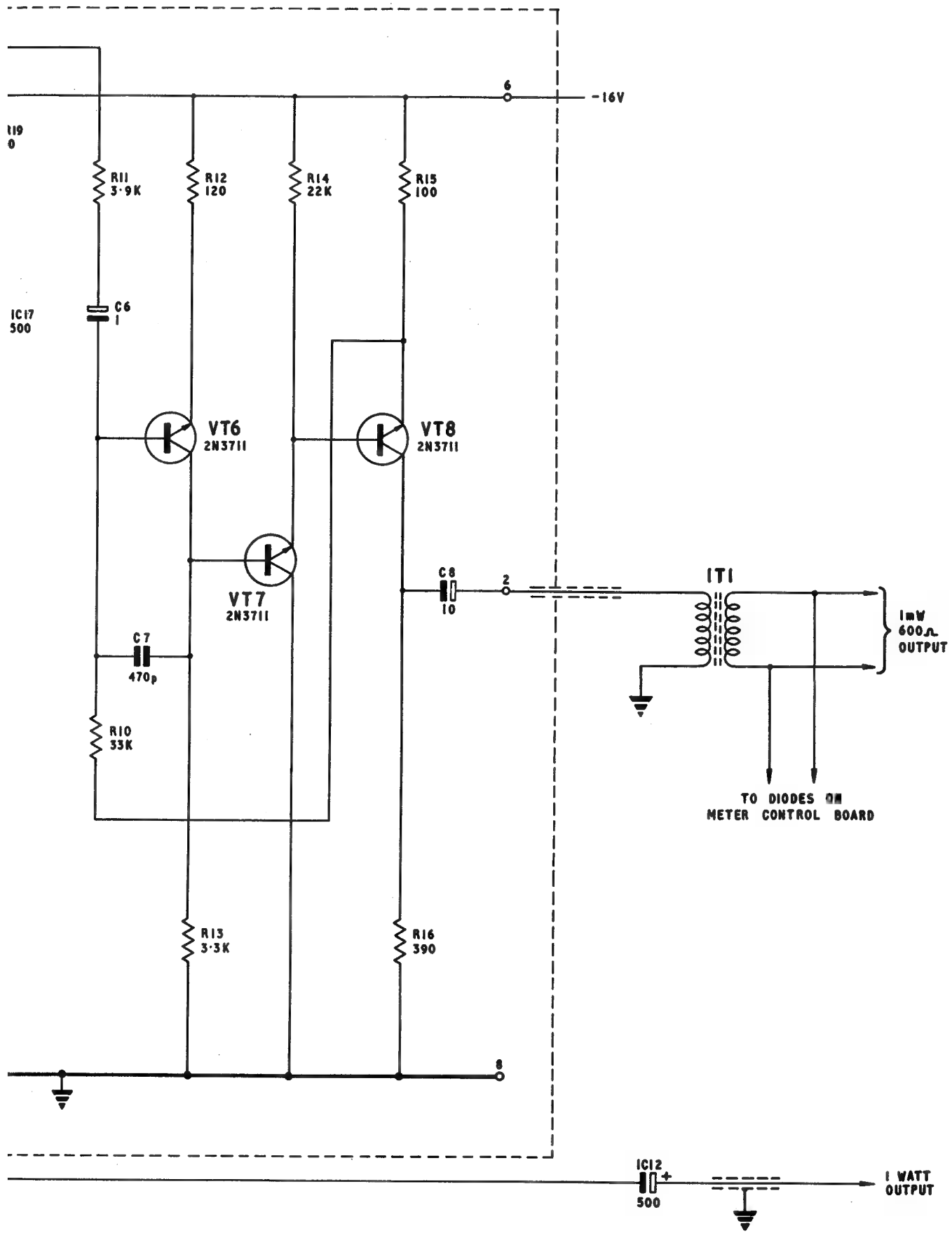


NOTE : COMPONENTS PREFIXED '1' ARE NOT MOUNTED ON THE BOARD

Circuit: Au

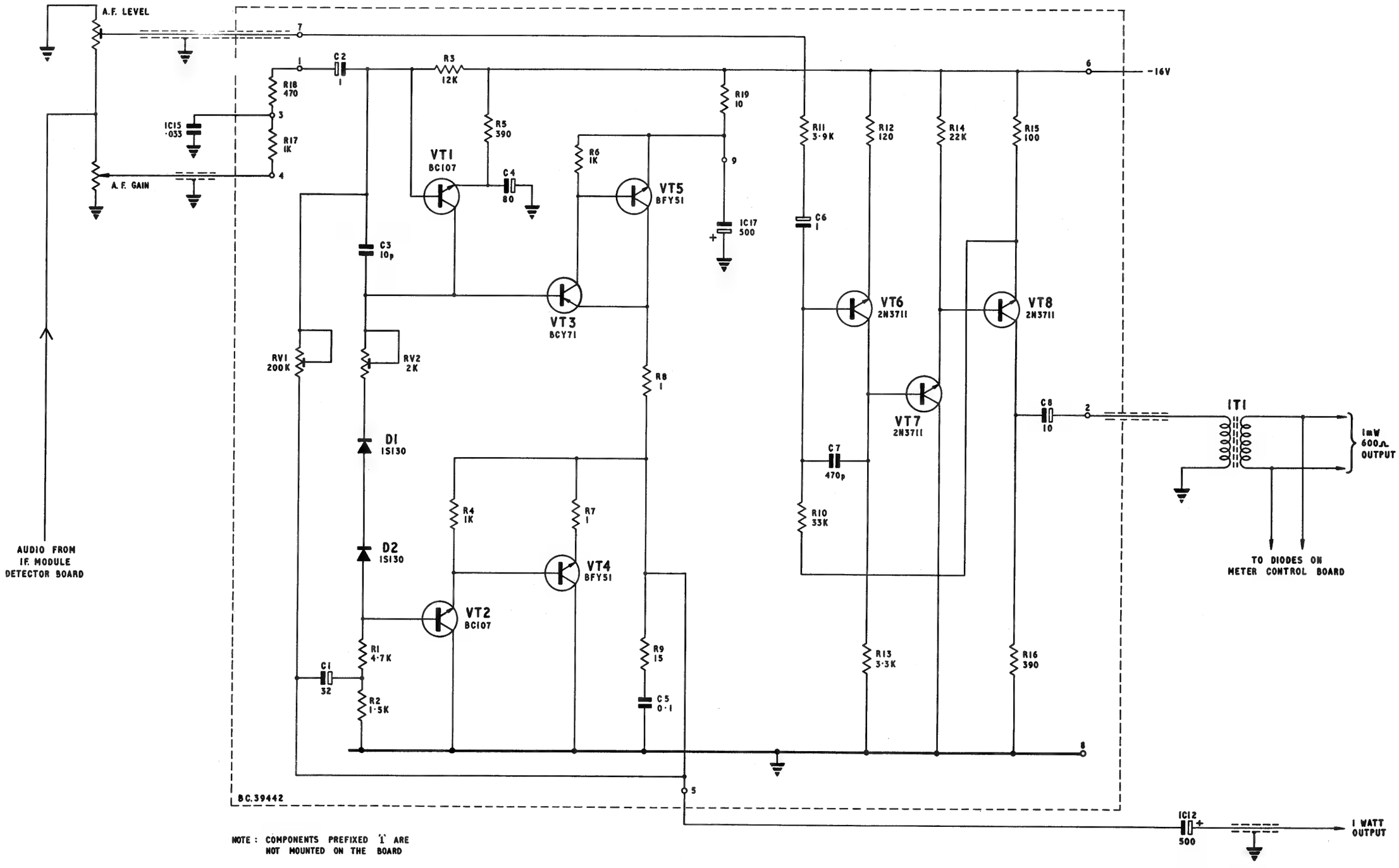


Circuit: Audio Amplifier Board
(1 Watt)



ifier Board

Fig.14b



NOTE : COMPONENTS PREFIXED '1' ARE NOT MOUNTED ON THE BOARD

DC38450/F6 281/14b
1 3 9

Circuit: Audio Amplifier Board (1 Watt)

Fig.14b

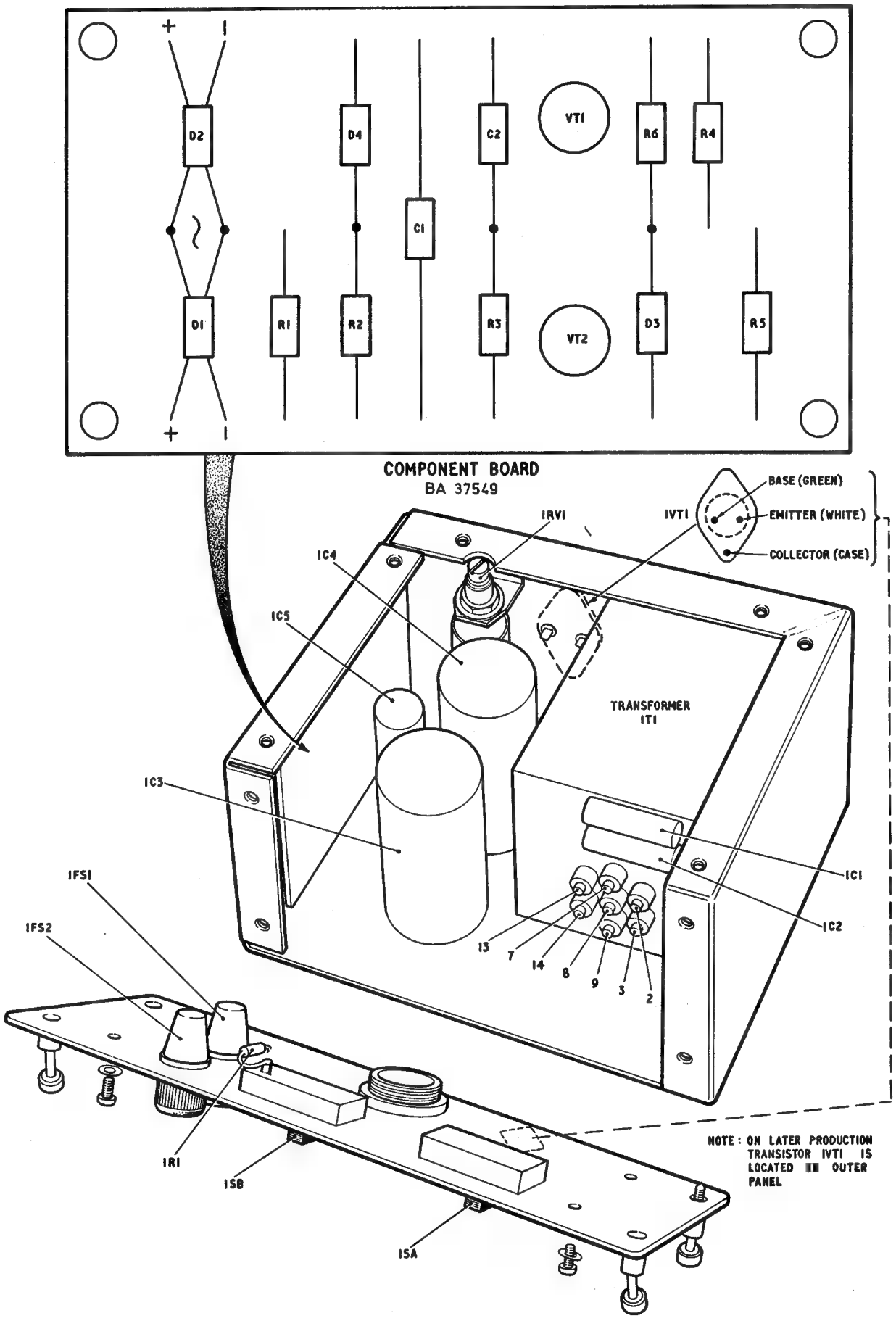
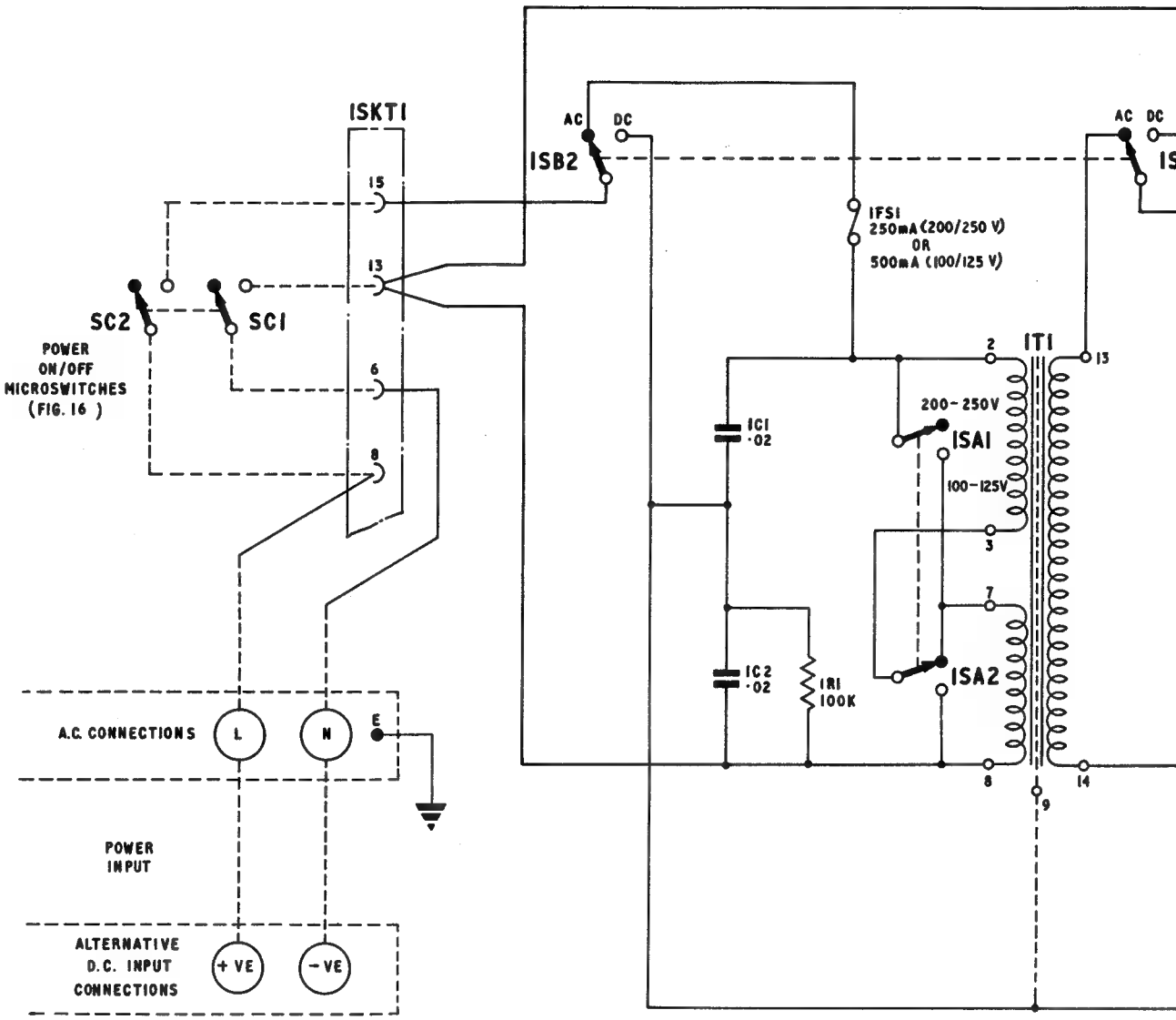


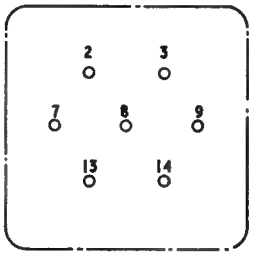
Fig. L-15a Layout: Power Unit Type PU.1153

281/L-15a



TRANSFORMER CONNECTIONS

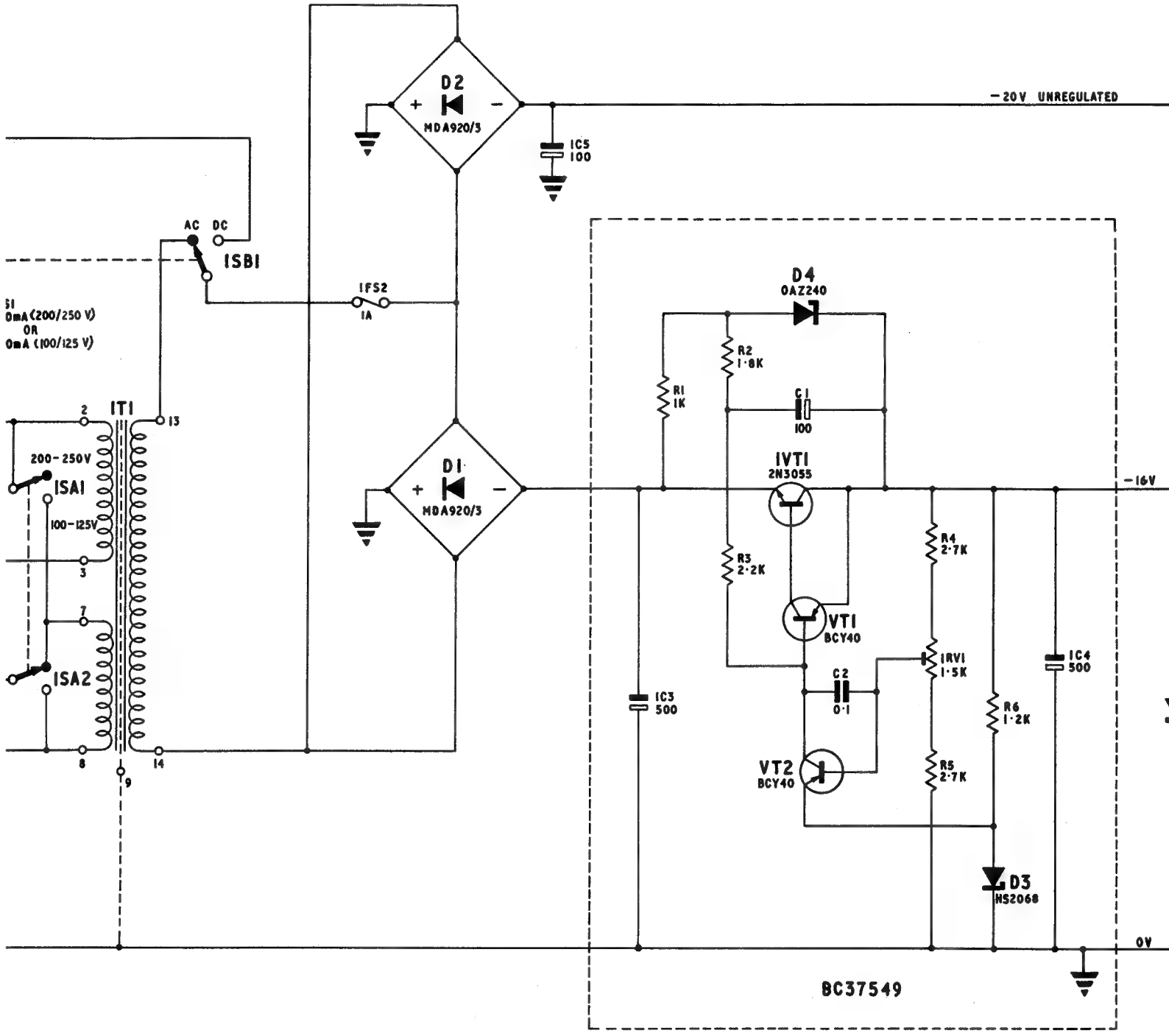
WIRING CODE	
TERMINAL	COLOUR
2	RED/GREEN
3	RED/WHITE
7	BLUE/WHITE
8	RED/BLACK
9	BLACK
13	RED/BLUE
14	RED/BLUE



IT1 TRANSFORMER TERMINALS

BC 38640	281/15a
1 2 3	

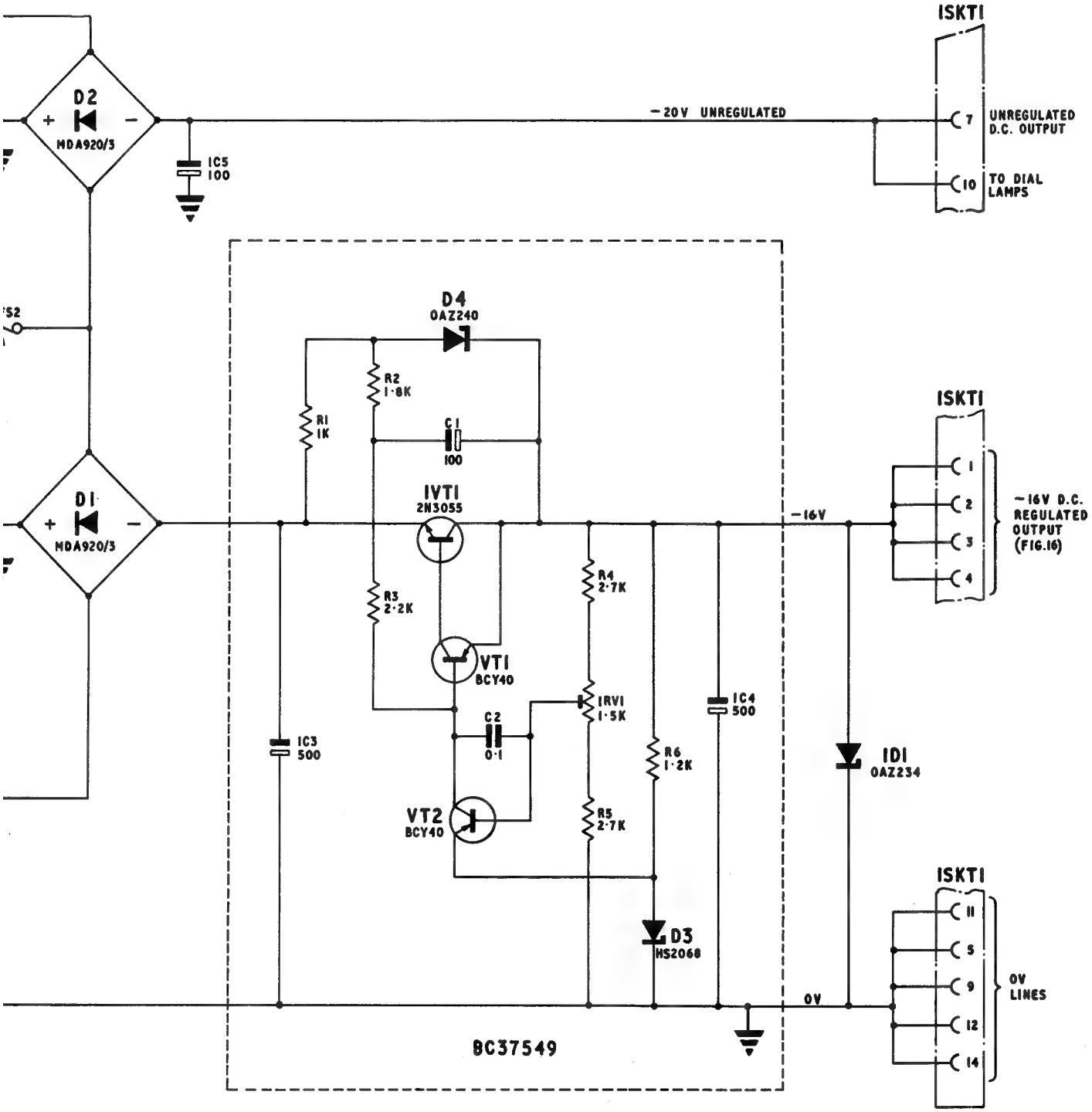
Circuit:



NOTES

1. WHEN OPERATING FROM 100 - 125V SUPPLY THE RATING OF FUSE IFS1 MUST BE 500mA
2. COMPONENTS PREFIXED I ARE NOT MOUNTED ON THE PRINTED CIRCUIT BOARD

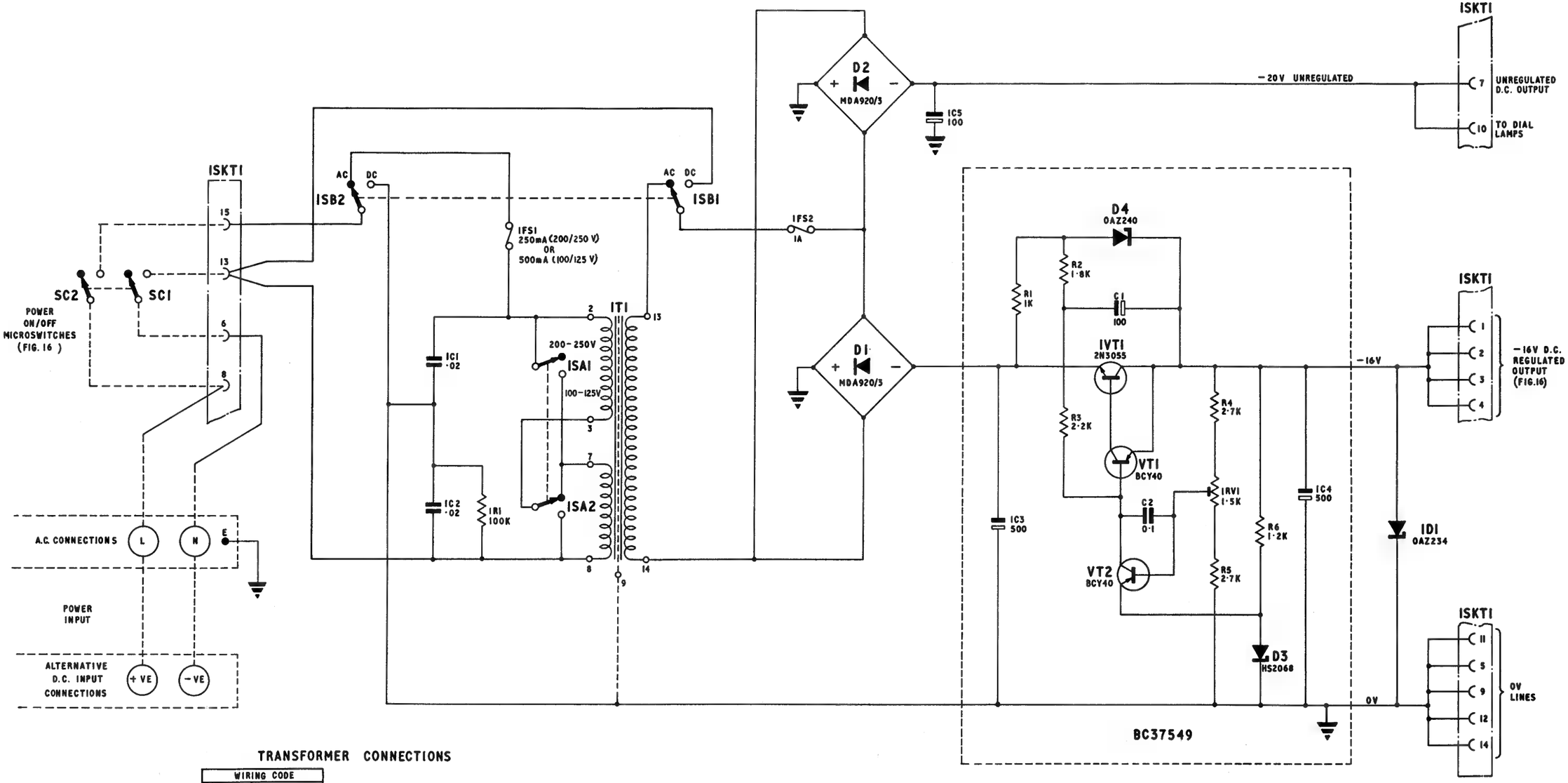
Circuit: Power Unit Type PU.1153



ıOM 100 - 125V SUPPLY
ɜE IFSI MUST BE 500mA
IXED I ARE NOT
PRINTED CIRCUIT BOARD

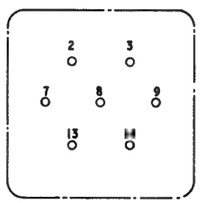
ıit Type PU.1153

Fig.15(a)



TRANSFORMER CONNECTIONS

WIRING CODE	
TERMINAL	COLOUR
2	RED/GREEN
3	RED/WHITE
7	BLUE/WHITE
8	RED/BLACK
9	BLACK
13	RED/BLUE
14	RED/BLUE



IT1 TRANSFORMER TERMINALS

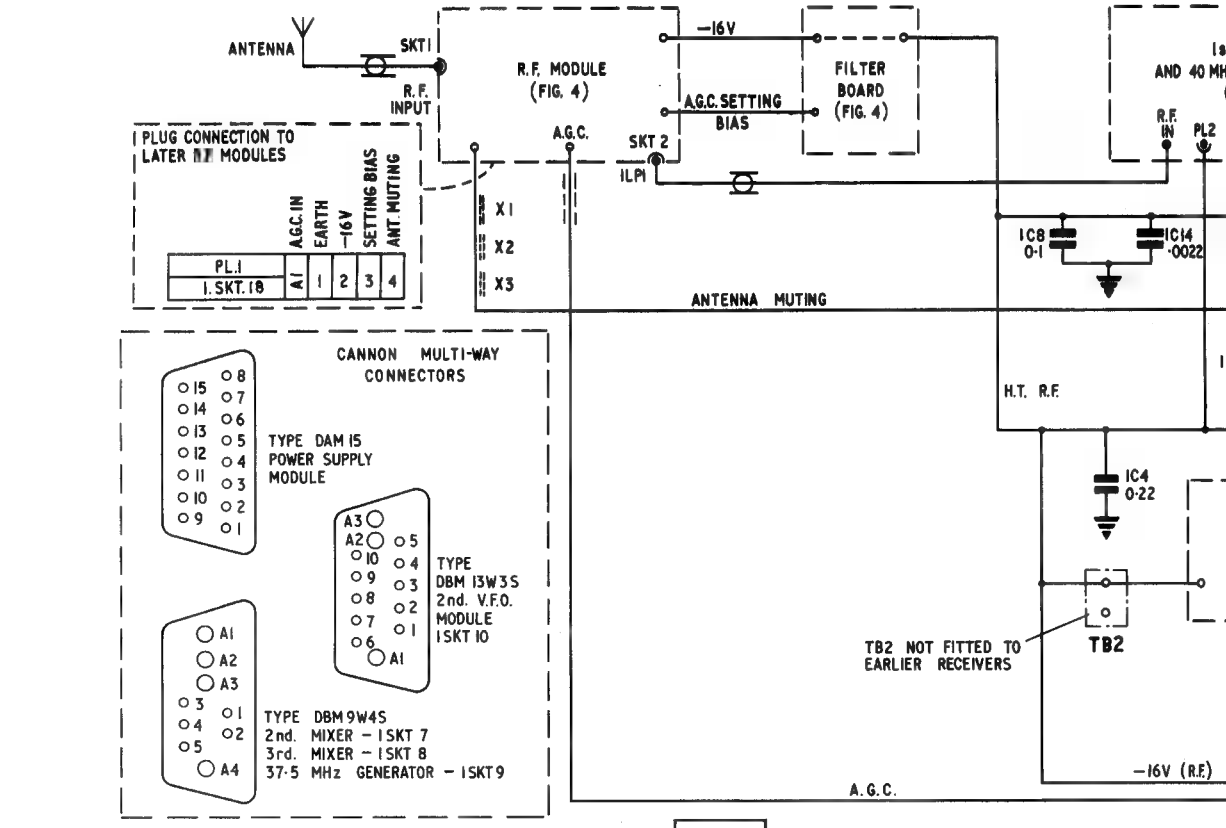
NOTES

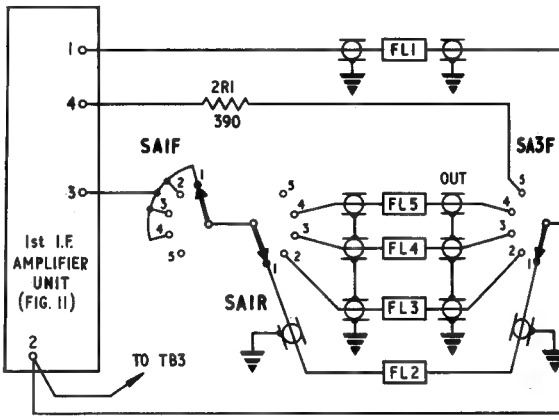
1. WHEN OPERATING FROM 100 ~ 125V SUPPLY THE RATING OF FUSE IFS1 MUST BE 500mA
2. COMPONENTS PREFIXED 1 ARE NOT MOUNTED ON THE PRINTED CIRCUIT BOARD

BC 38640	281/15a
1 2 3	

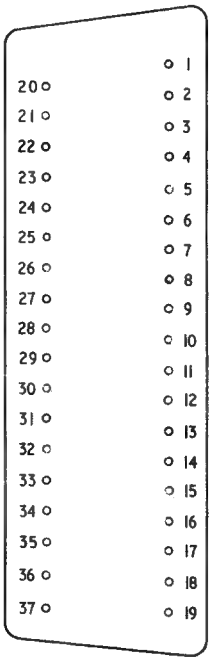
Circuit: Power Unit Type PU.1153

Fig.15(a)

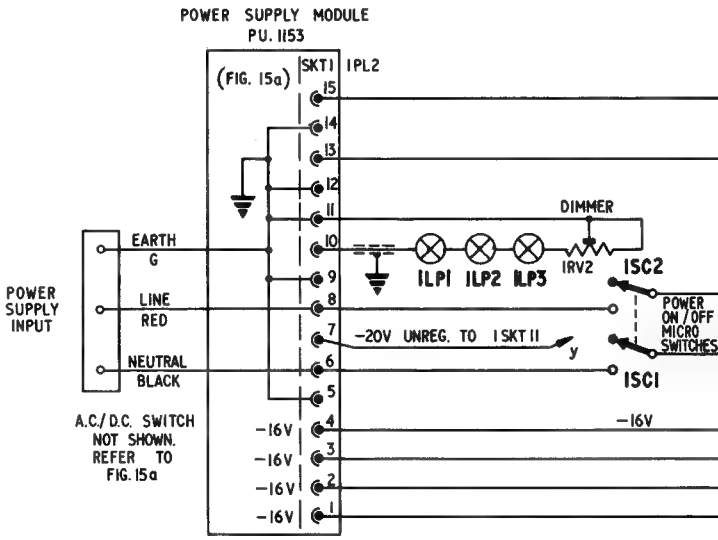


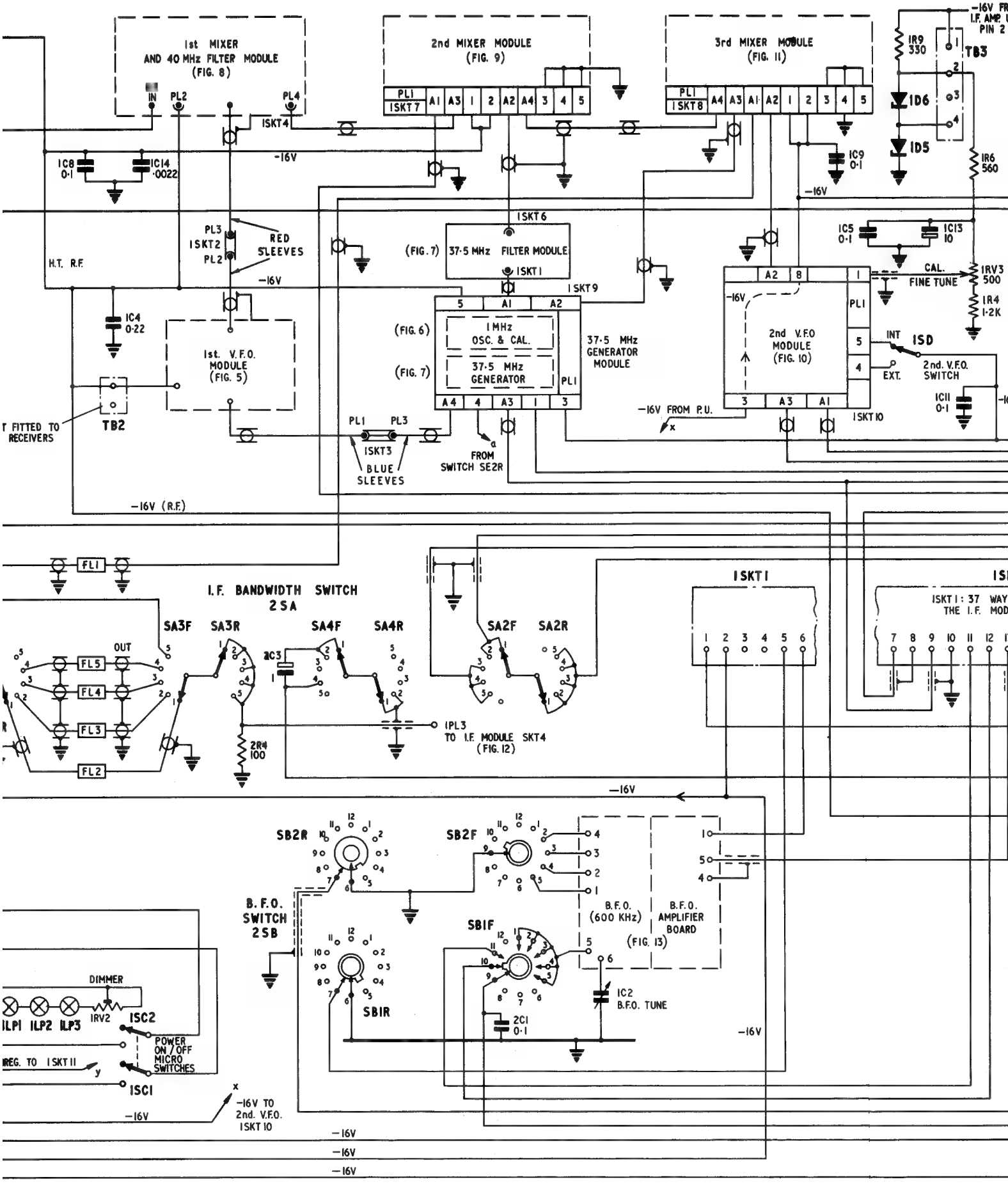


I.F. UNIT CONNECTOR ISKT1 KEY TO FUNCTION OF PINS		
	1	SCREEN
	2	-16V
	3	NOT USED
	4	NOT USED
	5	B.F.O. SWITCH
	6	-16V TO B.F.O.
	7	AUDIO OUT
	8	SCREEN
	9	1 MHz IN
	10	SCREEN
	11	1·5 KHz B.F.O. (L.S.B.)
	12	1·5 KHz B.F.O. (U.S.B.)
	13	600 KHz B.F.O. IN
	14	SCREEN
	15	A.G.C. / MANUAL
	16	A.G.C. / MANUAL
	17	-16V R.F.
	18	-16V L.F.
	19	
	20	A.G.C. SHORT
	21	A.G.C. MEDIUM
	22	SCREEN
	23	SCREEN
	24	A.G.C. LONG
	25	SCREEN
	26	A.G.C. DIVERSITY
	27	SCREEN
	28	A.G.C. L.F.
	29	A.G.C. R.F.
	30	SCREEN
	31	B.F.O. SWITCH
	32	SCREEN
	33	SCREEN
	34	A.G.C. TO μ SWITCH S.A.
	35	A.G.C. TO METER
	36	SCREEN
	37	-16V

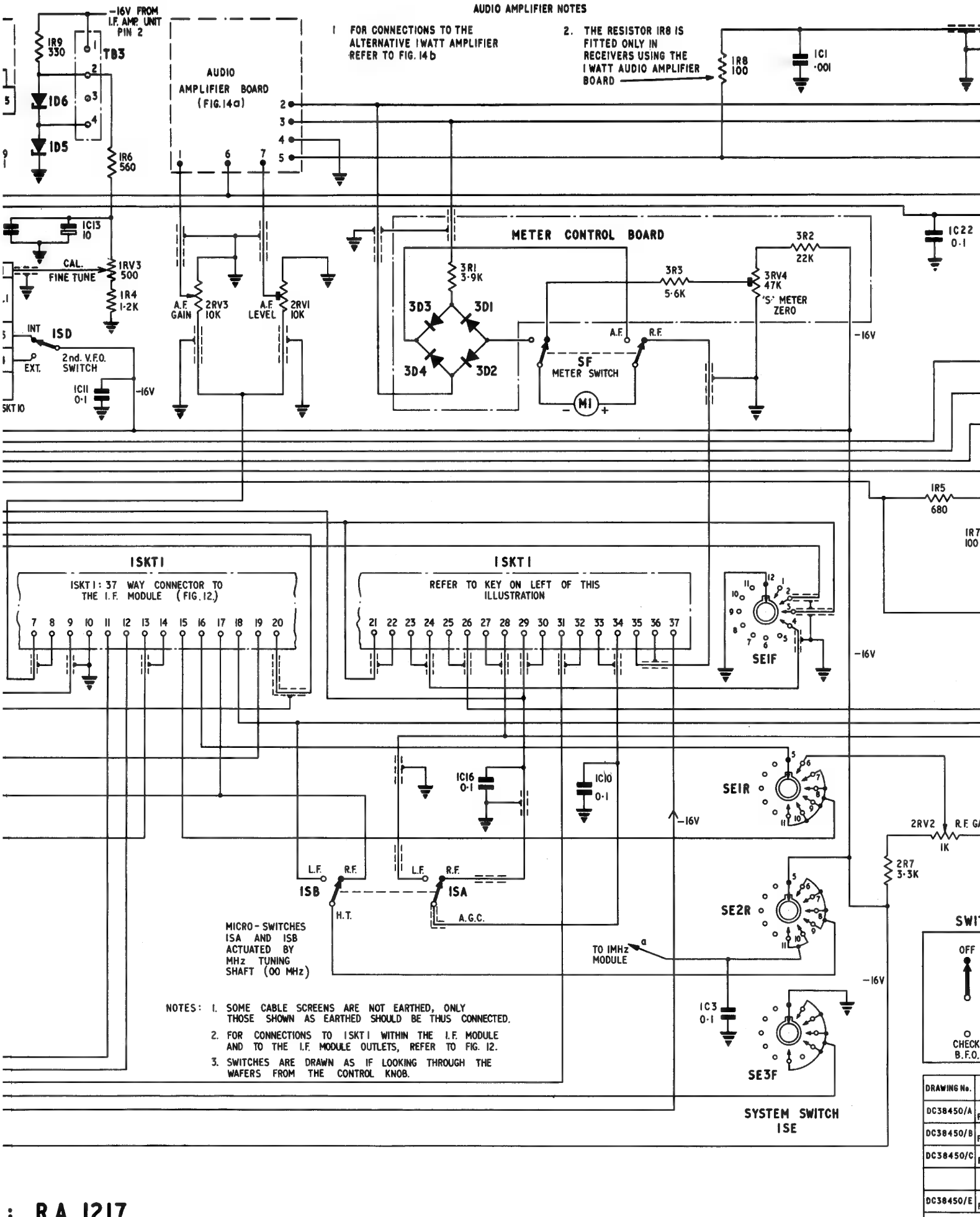


37-WAY CONNECTOR TYPE DCM37S PIN IDENTIFICATION

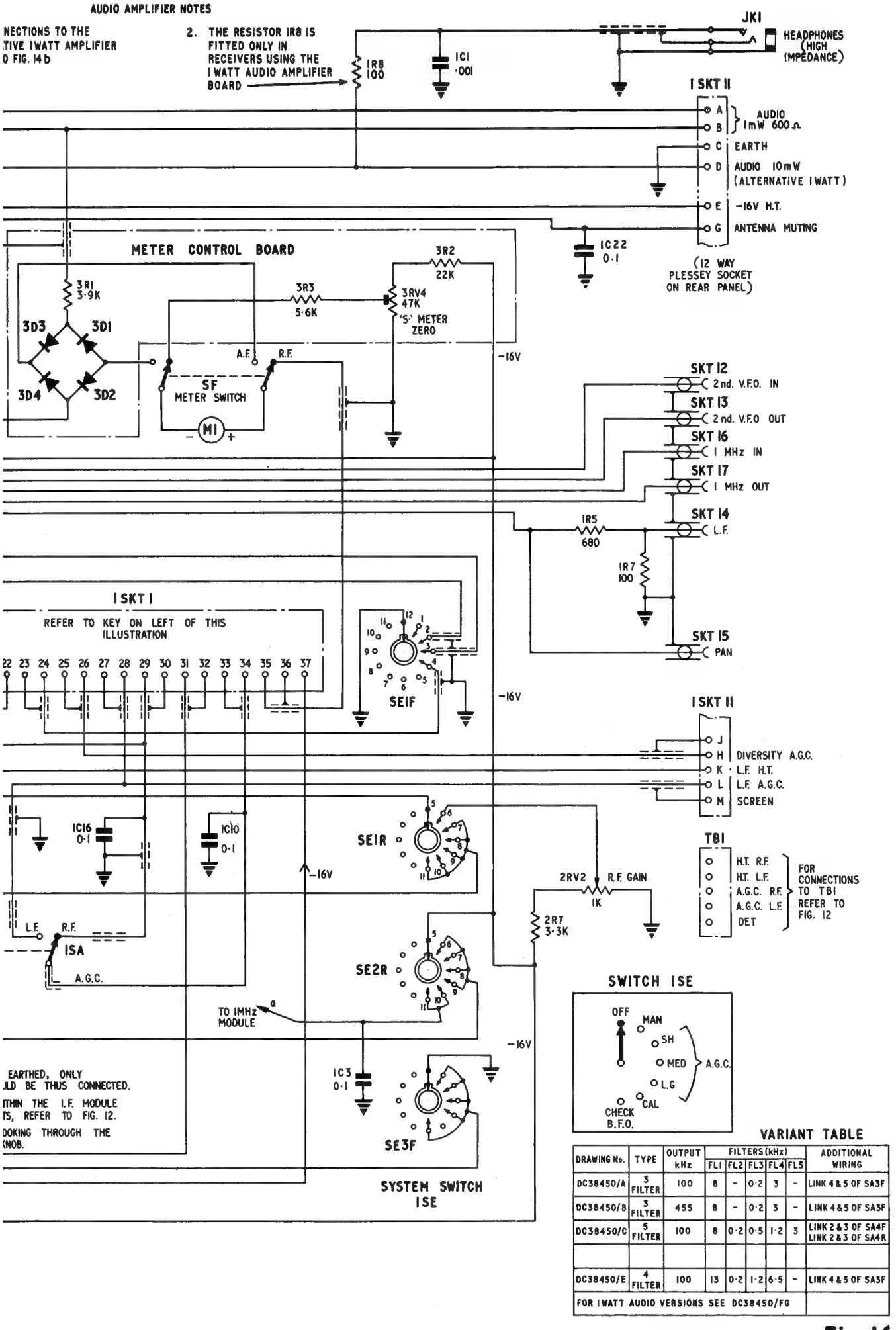




Interconnections : R A. 1217


AUDIO AMPLIFIER NOTES
1 FOR CONNECTIONS TO THE ALTERNATIVE 1 WATT AMPLIFIER REFER TO FIG. 14b
2. THE RESISTOR IR8 IS FITTED ONLY IN RECEIVERS USING THE 1 WATT AUDIO AMPLIFIER BOARD
-16V FROM I.F. AMP. UNIT PIN 2
TB3
AUDIO AMPLIFIER BOARD (FIG. 14a)
IR9 330
ID6
ID5
IR6 560
IR8 100
IC1 ·001
IC13 10
CAL. FINE TUNE
IRV3 500
IR4 1·2K
INT
EXT.
ISD
2nd. V.F.O. SWITCH
IC11 0·1
-16V
A.F. GAIN
2RV3 10K
A.F. LEVEL
2RV1 10K
METER CONTROL BOARD
3R1 3·9K
3D3
3D1
3D4
3D2
3R3 5·6K
3R2 22K
3RV4 47K 'S' METER ZERO
A.F.
R.F.
SF METER SWITCH
M1
IC22 0·1
IR5 680
ISKT1
ISKT1: 37 WAY CONNECTOR TO THE I.F. MODULE (FIG. 12.)
7 8 9 10 11 12 13 14 15 16 17 18 19 20
ISKT1
REFER TO KEY ON LEFT OF THIS ILLUSTRATION
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
SE1F
IC16 0·1
IC10 0·1
SE1R
2RV2 1K
2R7 3·3K
L.F.
R.F.
ISB
H.T.
ISA
A.G.C.
SE2R
MICRO-SWITCHES ISA AND ISB ACTUATED BY MHz TUNING SHAFT (00 MHz)
TO 1MHz MODULE
IC3 0·1
SE3F
SYSTEM SWITCH ISE
OFF
CHECK B.F.O.
NOTES: 1. SOME CABLE SCREENS ARE NOT EARTHED, ONLY THOSE SHOWN AS EARTHED SHOULD BE THUS CONNECTED.
2. FOR CONNECTIONS TO ISKT1 WITHIN THE I.F. MODULE AND TO THE I.F. MODULE OUTLETS, REFER TO FIG. 12.
3. SWITCHES ARE DRAWN AS IF LOOKING THROUGH THE WAFERS FROM THE CONTROL KNOB.
DRAWING No.
DC38450/A
DC38450/B
DC38450/C
DC38450/E
FOR 1 WATT A

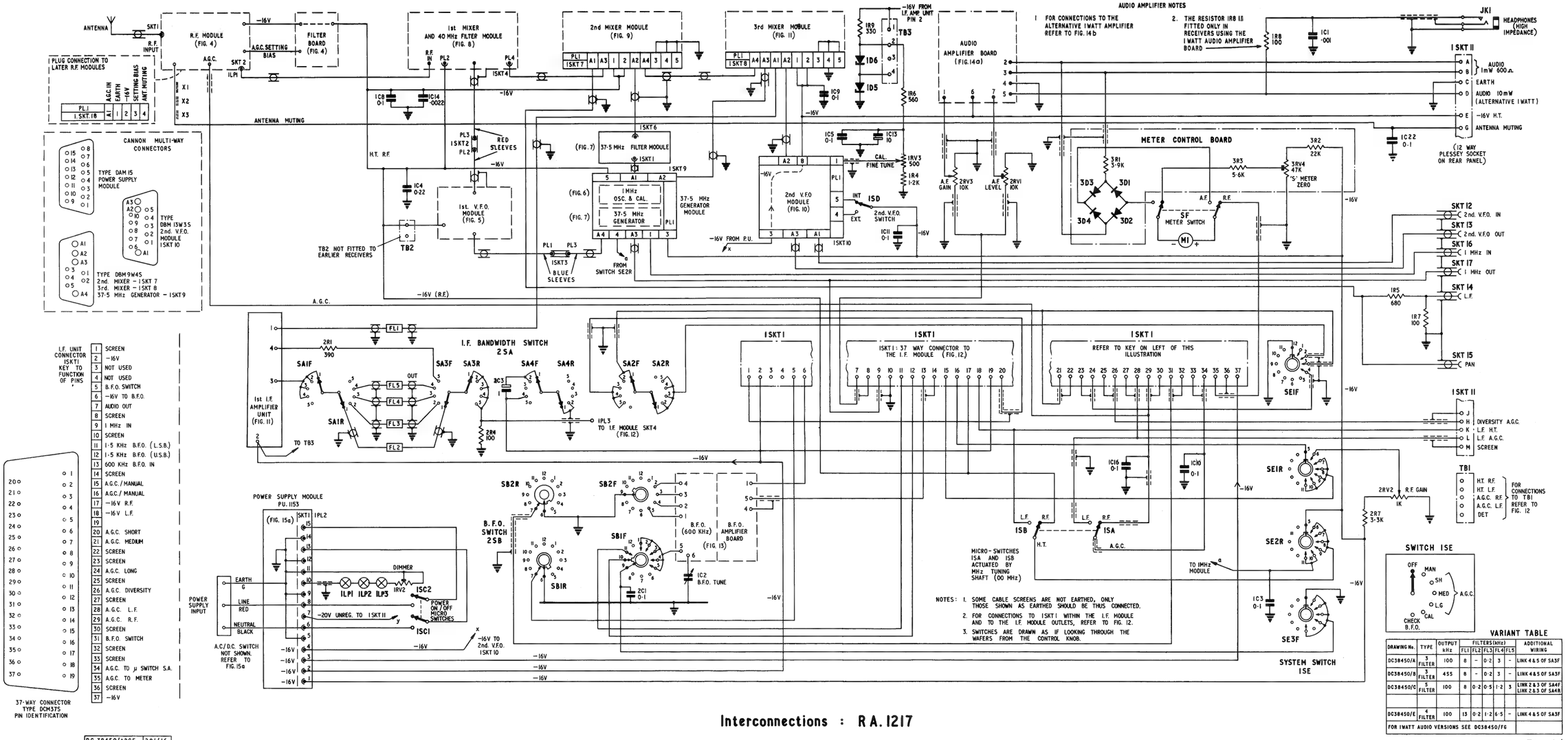
: RA.1217



VARIANT TABLE

DRAWING No.	TYPE	OUTPUT kHz	FILTERS (kHz) FL1	FL2	FL3	FL4	FL5	ADDITIONAL WIRING
DC38450/A	3 FILTER	100	8	-	0·2	3	-	LINK 4 & 5 OF SA3F
DC38450/B	3 FILTER	455	8	-	0·2	3	-	LINK 4 & 5 OF SA3F
DC38450/C	5 FILTER	100	8	0·2	0·5	1·2	3	LINK 2 & 3 OF SA4F LINK 2 & 3 OF SA4R
DC38450/E	4 FILTER	100	13	0·2	1·2	6·5	-	LINK 4 & 5 OF SA3F
FOR I WATT AUDIO VERSIONS SEE DC38450/FG								

Fig. 16



VARIANT TABLE

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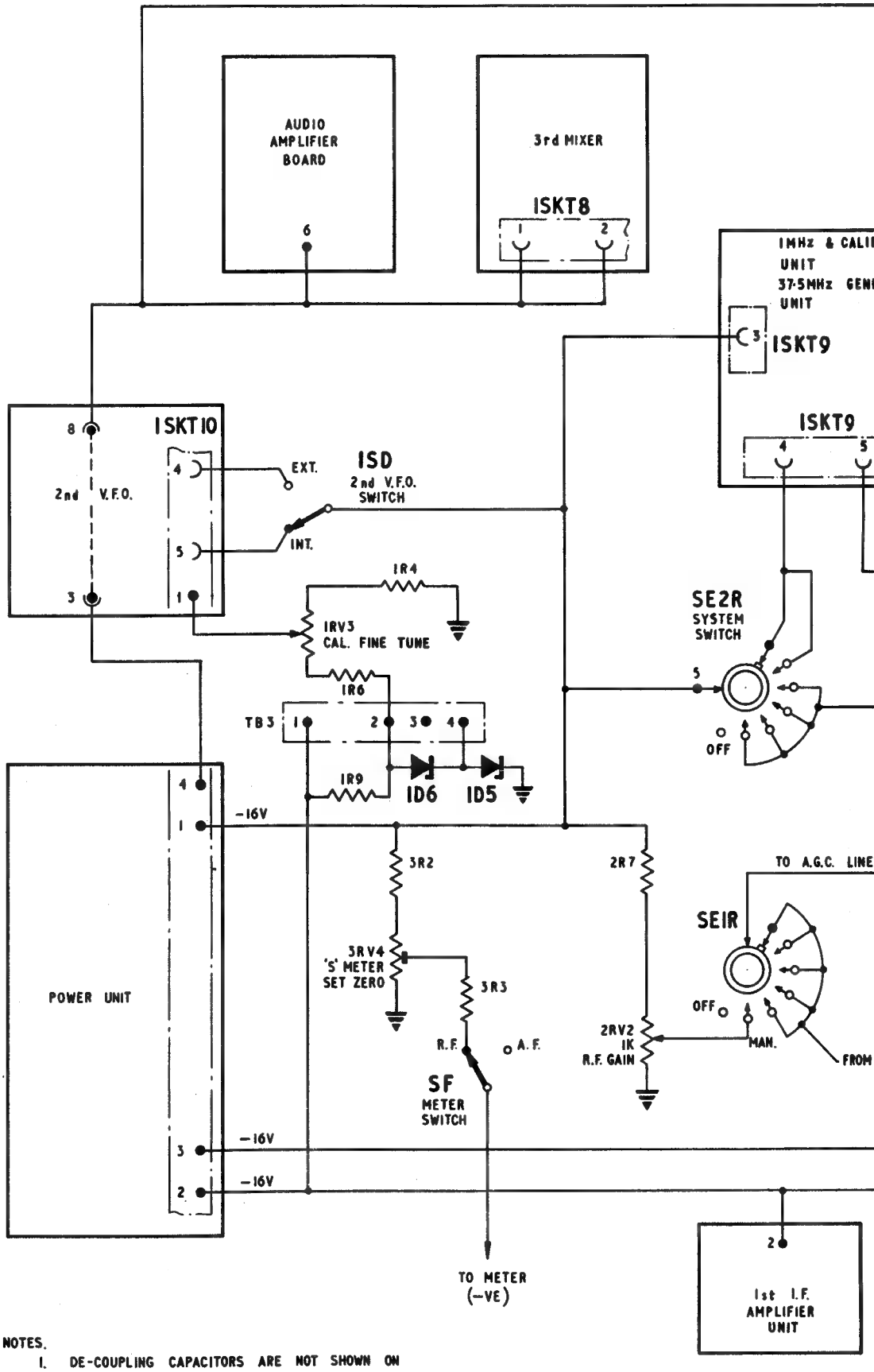
DC38450/C	5 FILTER	100	8	0·2	0·5	1·2	3	LINK 2 & 3 OF SA4F LINK 2 & 3 OF SA4R
DC38450/E	4 FILTER	100	13	0·2	1·2	6·5	-	LINK 4 & 5 OF SA3F
FOR 1WATT AUDIO VERSIONS SEE DC38450/FG								

DC 38450/ABCE 281/16
1 3 4 6 7

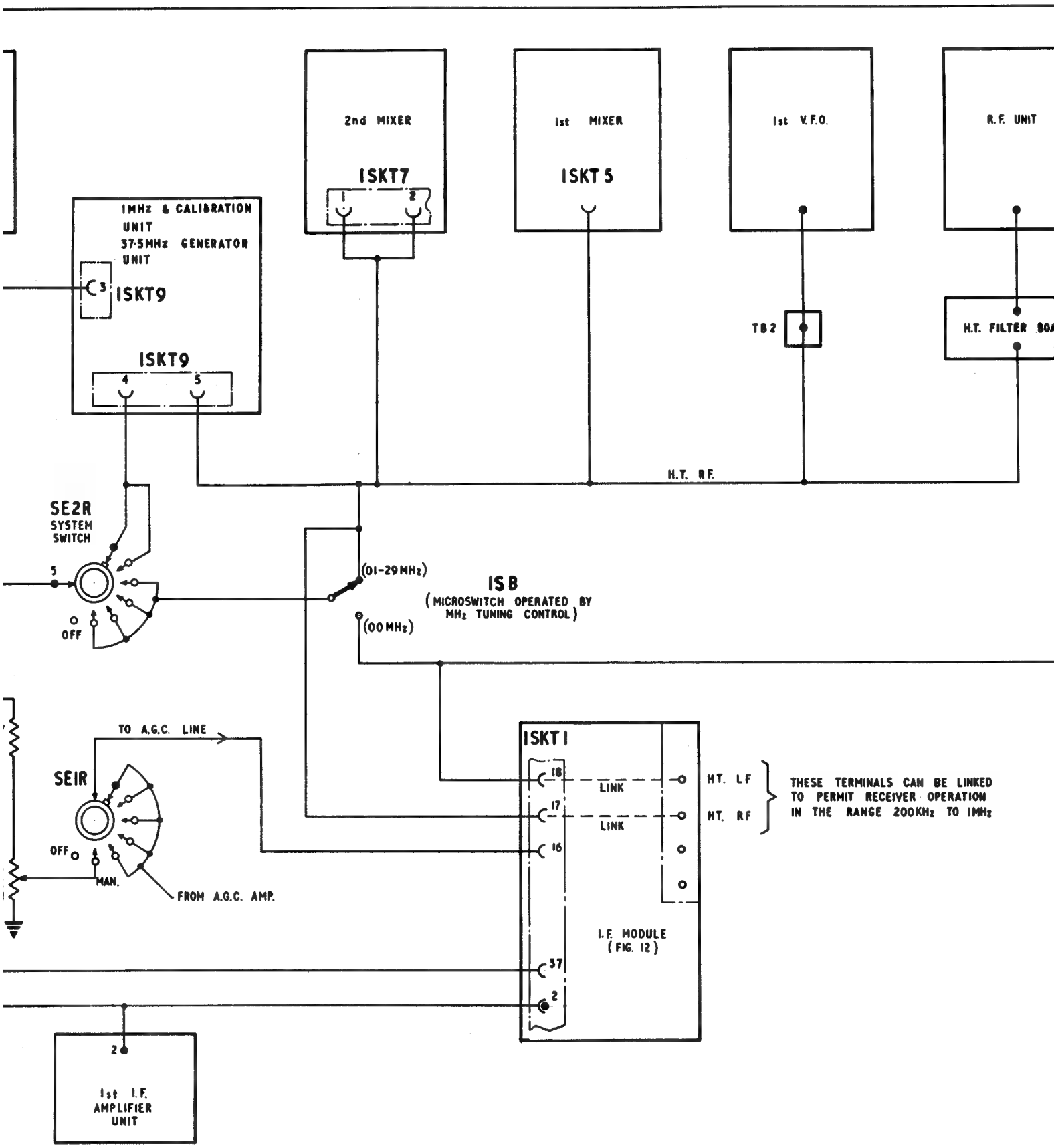
Interconnections : R.A.1217

Fig. 16

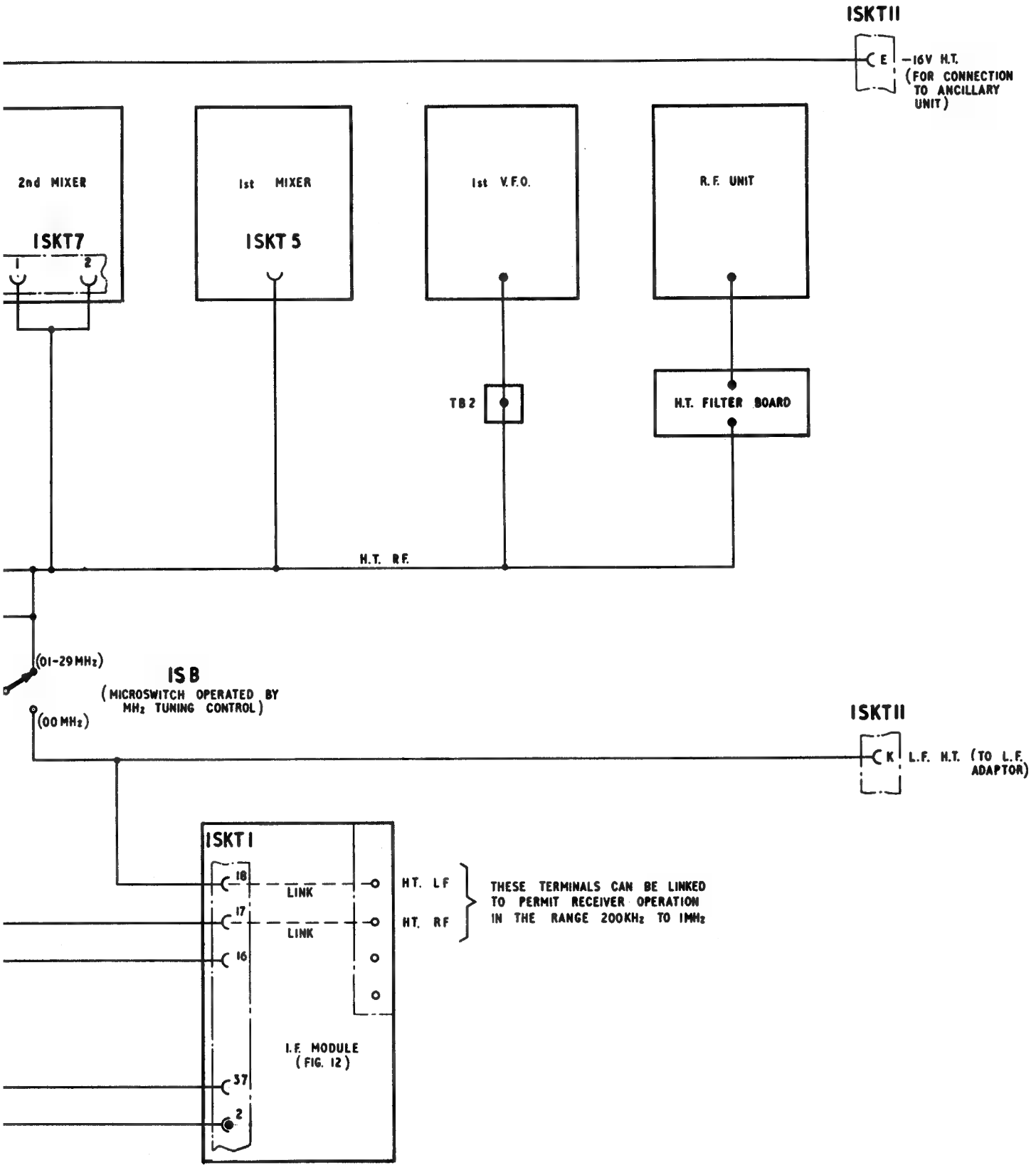


NOTES.

1. DE-COUPLING CAPACITORS ARE NOT SHOWN ON THIS ILLUSTRATION : REFER TO FIG. 16.
2. REFER TO FIG. 16 FOR RESISTOR VALUES.

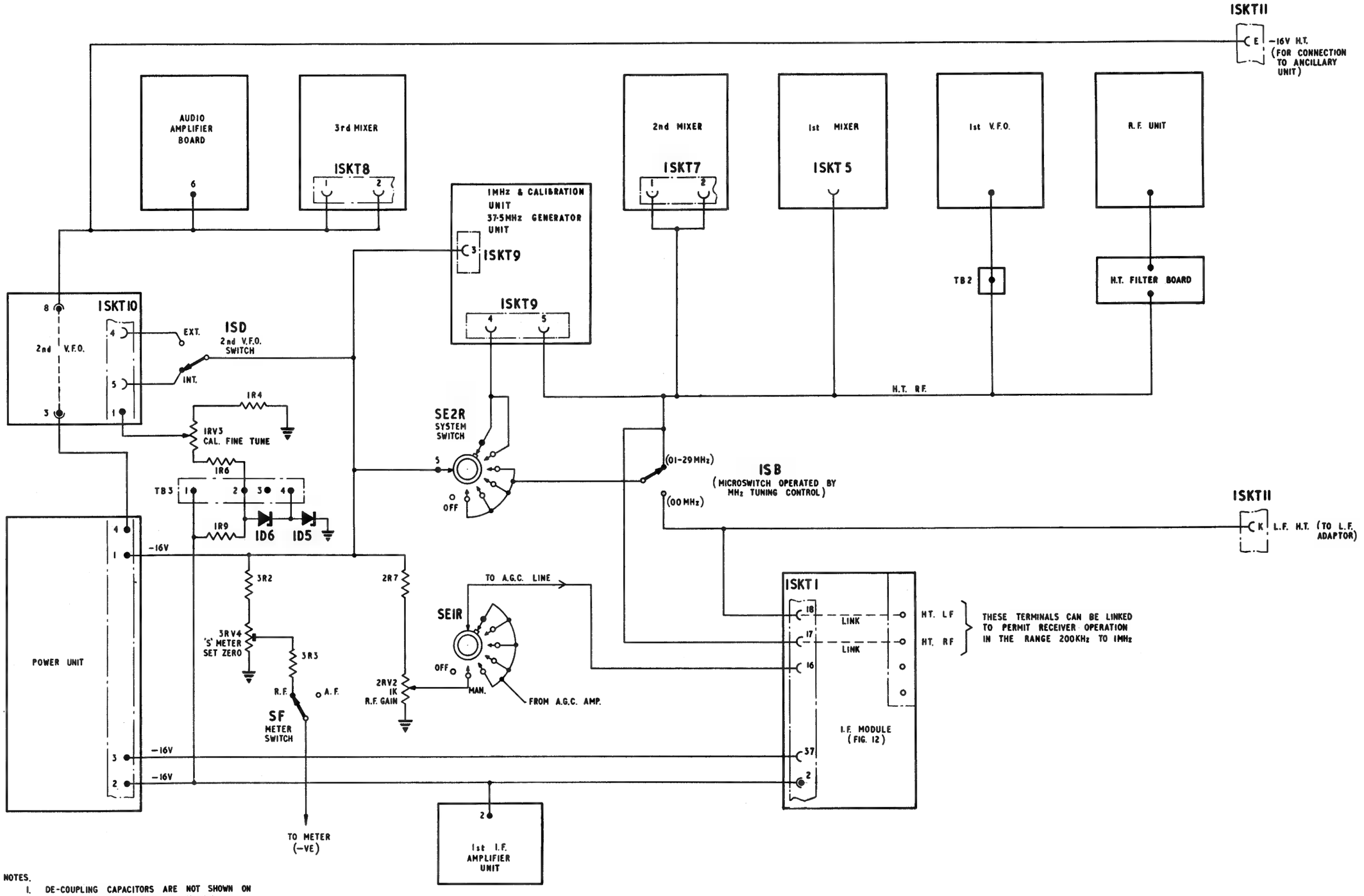


Interconnection Diagram : 16 Volt Supplies RA.1217



'am : 16 Volt Supplies RA.1217

Fig. 17

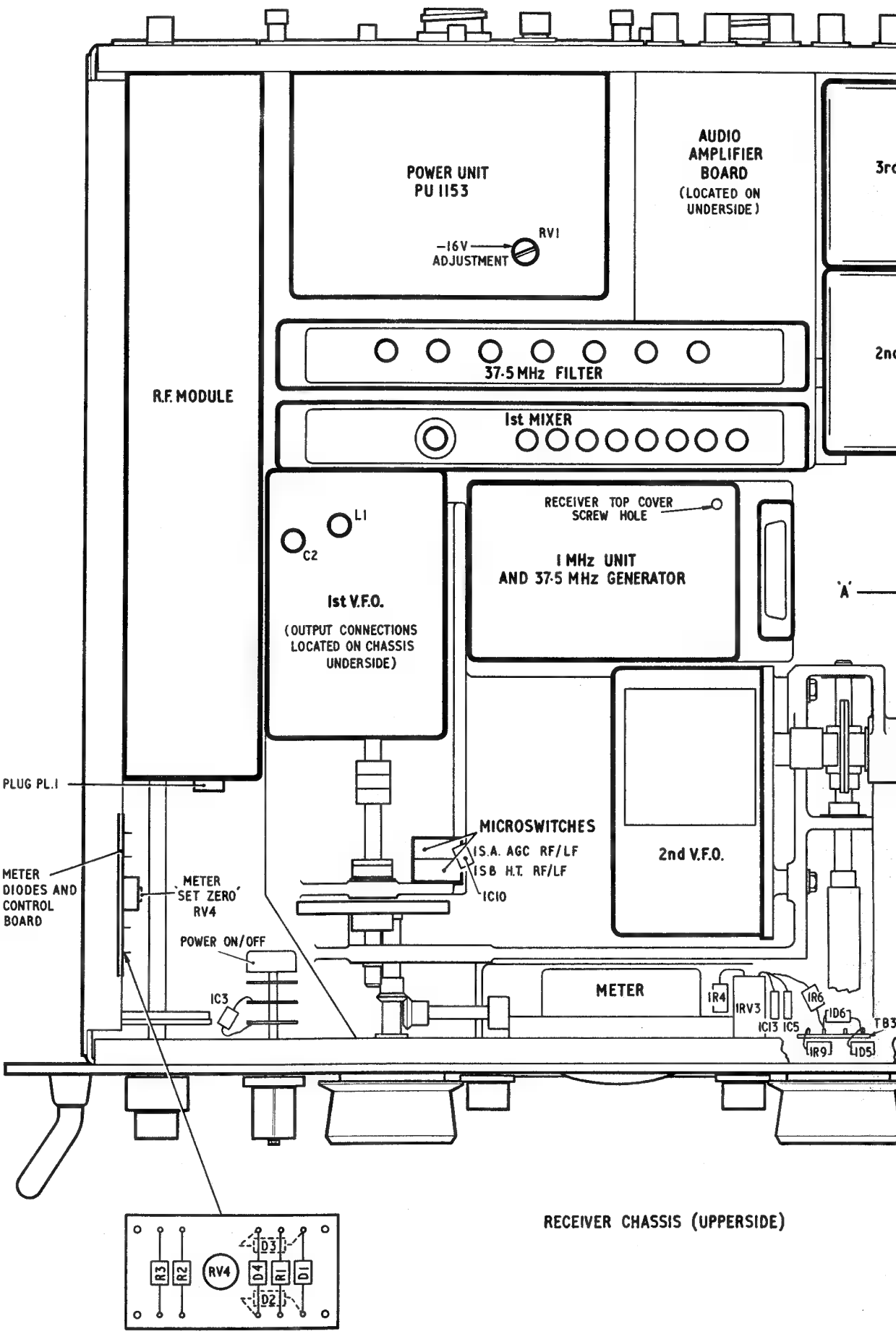


NOTES.

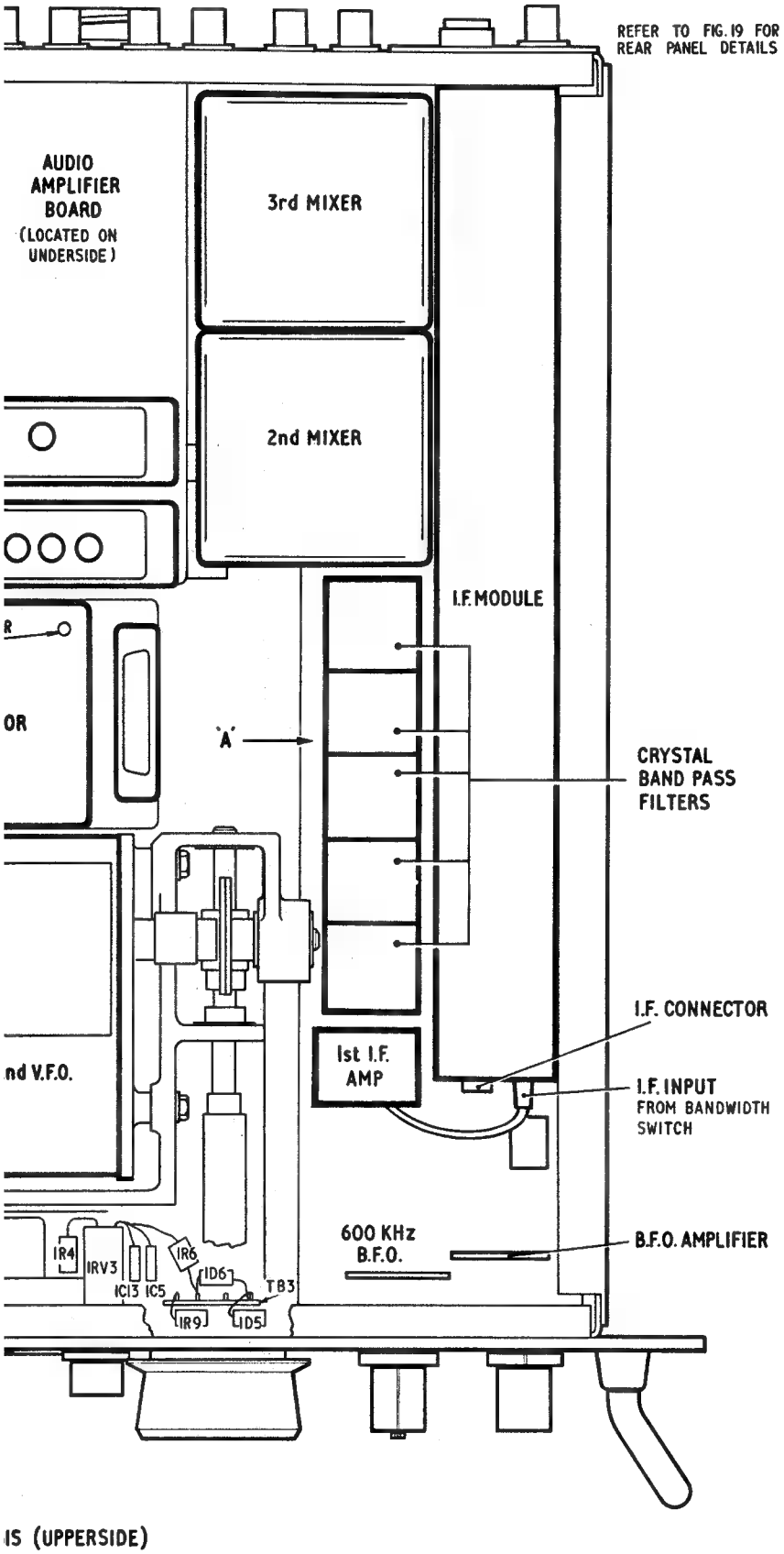
1. DE-COUPLING CAPACITORS ARE NOT SHOWN ON THIS ILLUSTRATION : REFER TO FIG. 16.
2. REFER TO FIG. 16 FOR RESISTOR VALUES.

Interconnection Diagram : 16 Volt Supplies RA.1217

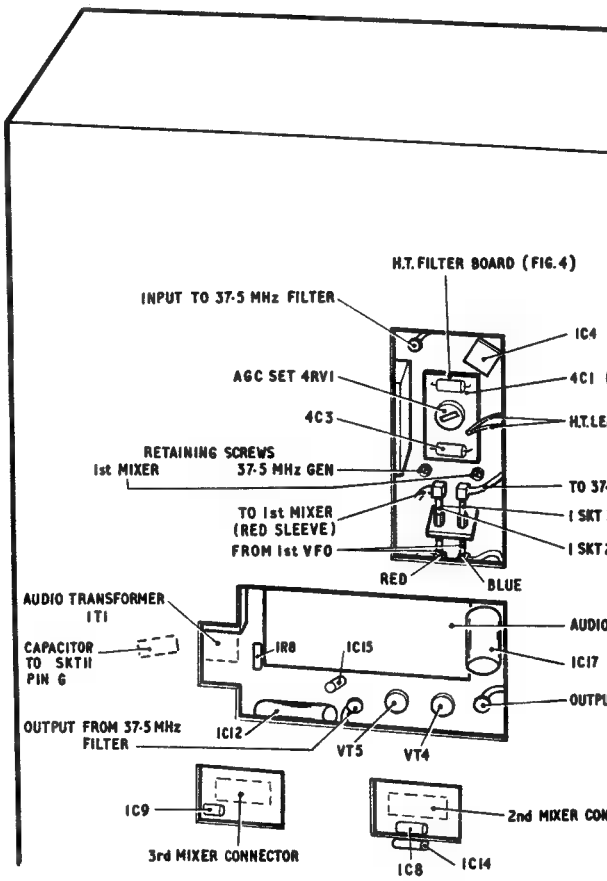
Fig. 17


POWER UNIT
PU 1153
-16V ADJUSTMENT
RV1
AUDIO AMPLIFIER BOARD
(LOCATED ON UNDERSIDE)
R.F. MODULE
37·5 MHz FILTER
1st MIXER
RECEIVER TOP COVER SCREW HOLE
1 MHz UNIT AND 37·5 MHz GENERATOR
L1
C2
1st V.F.O.
(OUTPUT CONNECTIONS LOCATED ON CHASSIS UNDERSIDE)
'A'
PLUG PL.1
MICROSWITCHES
I.S.A. AGC RF/LF
I.S.B H.T. RF/LF
IC10
2nd V.F.O.
METER DIODES AND CONTROL BOARD
METER 'SET ZERO' RV4
POWER ON/OFF
IC3
METER
IR4
IRV3
IR6
ID6
IC13
IC5
TB3
IR9
ID5
RECEIVER CHASSIS (UPPERSIDE)
R3
R2
RV4
D3
D4
R1
D1
D2

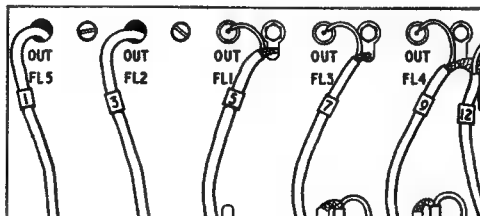
Chas



IS (UPPERSIDE)



RECEIVER CHASSIS (UNDER
(WITH ONE-WATT AMPLIFIER)

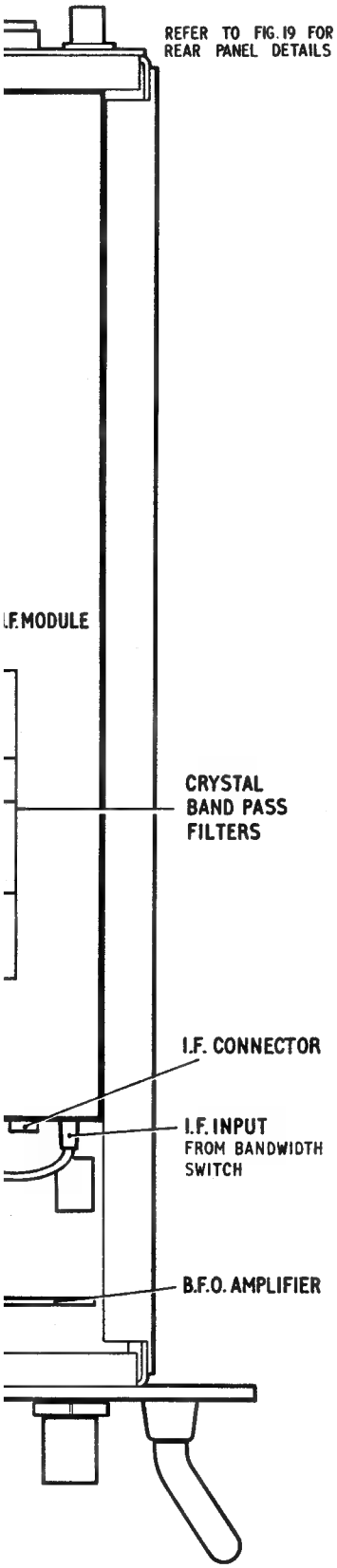


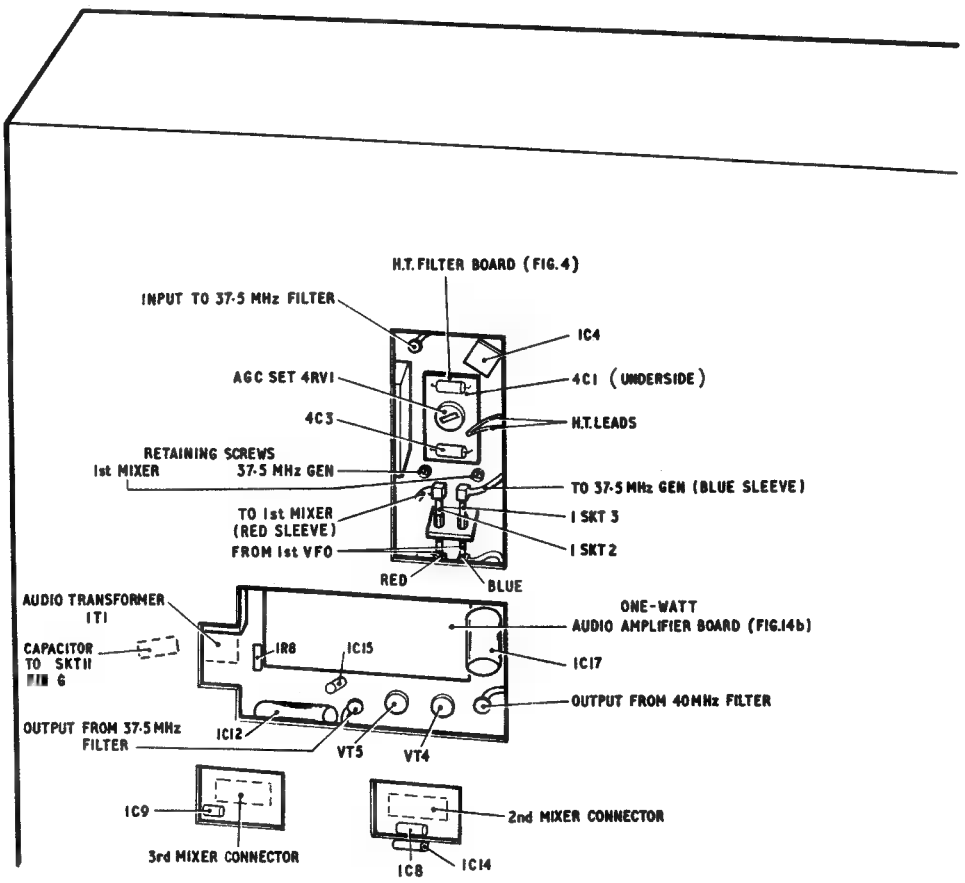
CABLE CONNECTIONS

1 FL5 OUT TO SA3F4	6 SA3R TO I.F. MODULE PL3/9
2 FL5 IN TO SA1R4	7 FL3 OUT TO SA3F2
3 FL2 OUT TO SA3F1	8 FL3 IN TO SA1R2
4 FL2 ■ TO SA1R1	9 FL4 OUT TO SA3F3
5 FL1 OUT TO 1st I.F. INPUT	10 FL4 ■ TO SA1R3

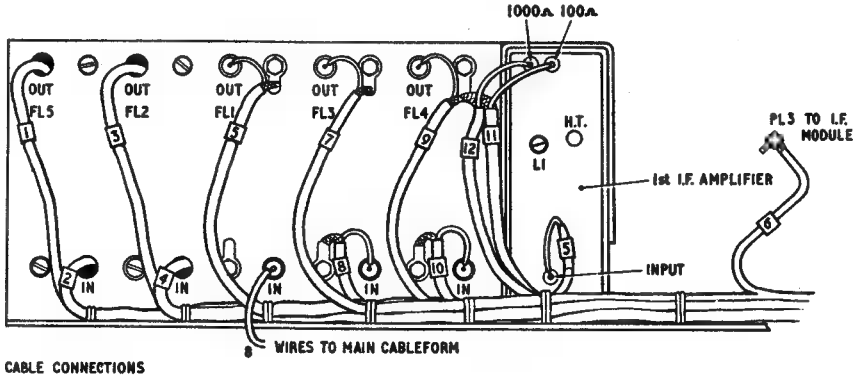
VIEW ON ARROW 'A'

Chassis Layouts: RA1217





RECEIVER CHASSIS (UNDERSIDE)
(WITH ONE-WATT AMPLIFIER)

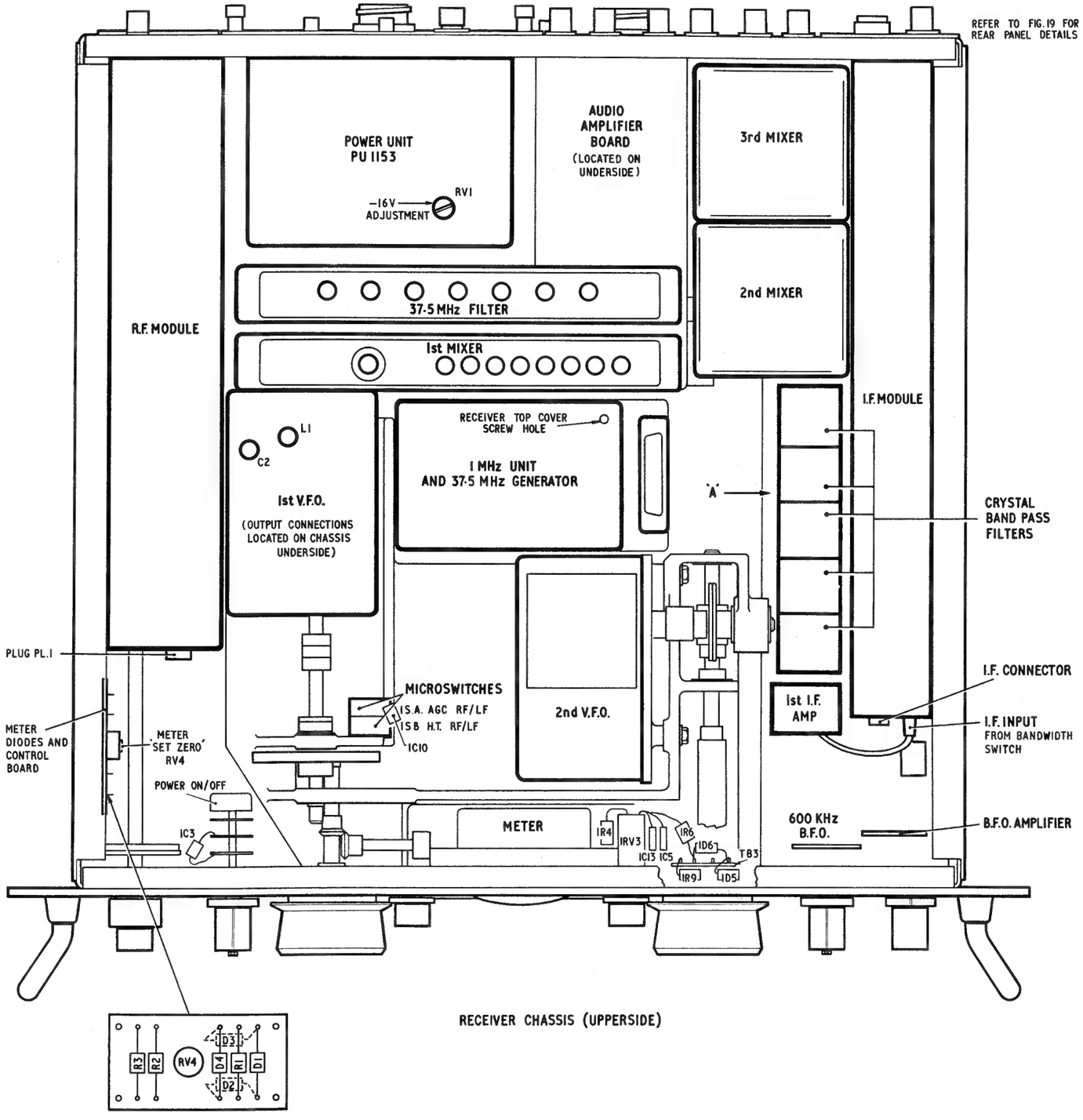


CABLE CONNECTIONS

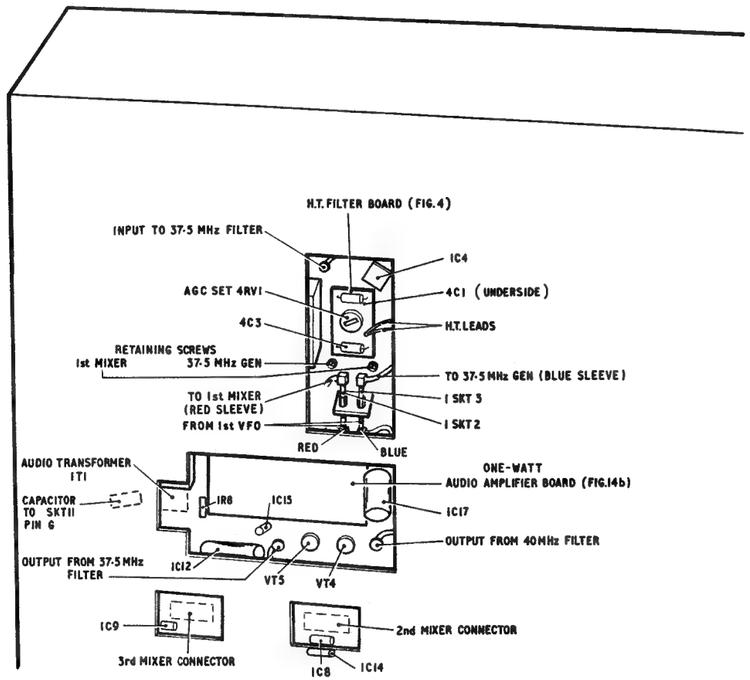
1 FL5 OUT TO SA3F4
2 FL5 IN TO SA1R4
3 FL2 OUT TO SA3F1
4 FL2 IN TO SA1R1
5 FL1 OUT TO 1st I.F. INPUT
6 SA3R TO I.F. MODULE PL3/SKT4
7 FL3 OUT TO SA3F2
8 FL3 IN TO SA1R2
9 FL4 OUT TO SA3F3
10 FL4 IN TO SA1R3
11 1st I.F. 100Ω TO SA3F5
12 1st I.F. 1000Ω TO SA3F1

VIEW ON ARROW 'A'

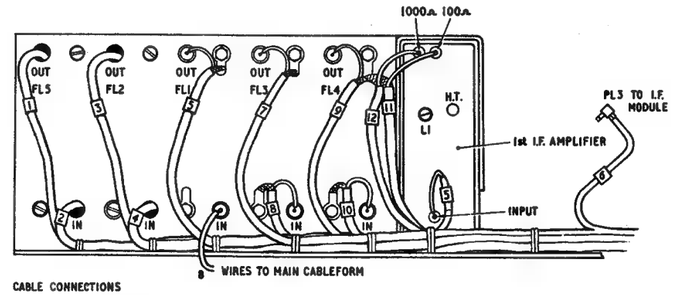
Fig. 18



RECEIVER CHASSIS (UPPERSIDE)



RECEIVER CHASSIS (UNDERSIDE)
(WITH ONE-WATT AMPLIFIER)



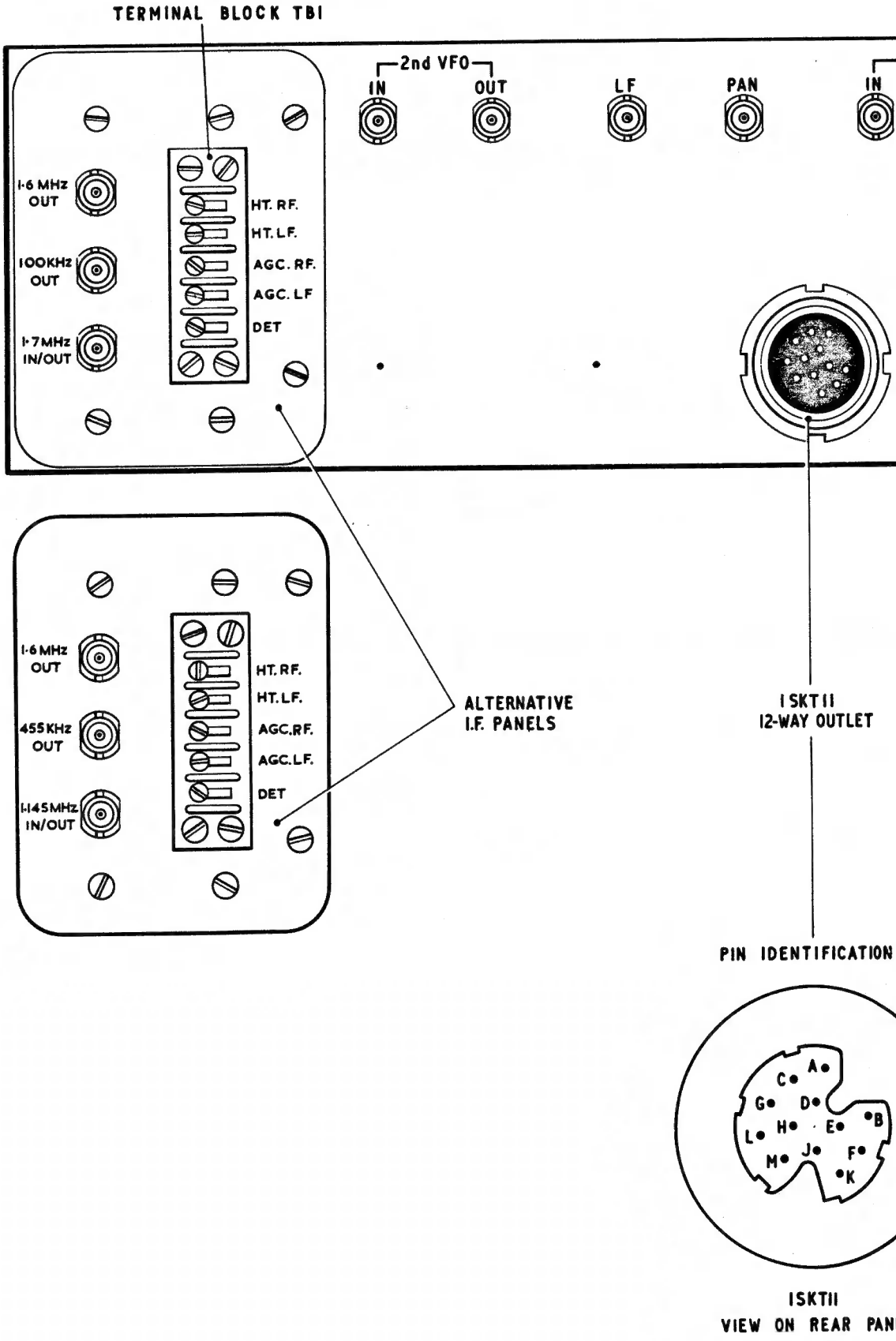
CABLE CONNECTIONS

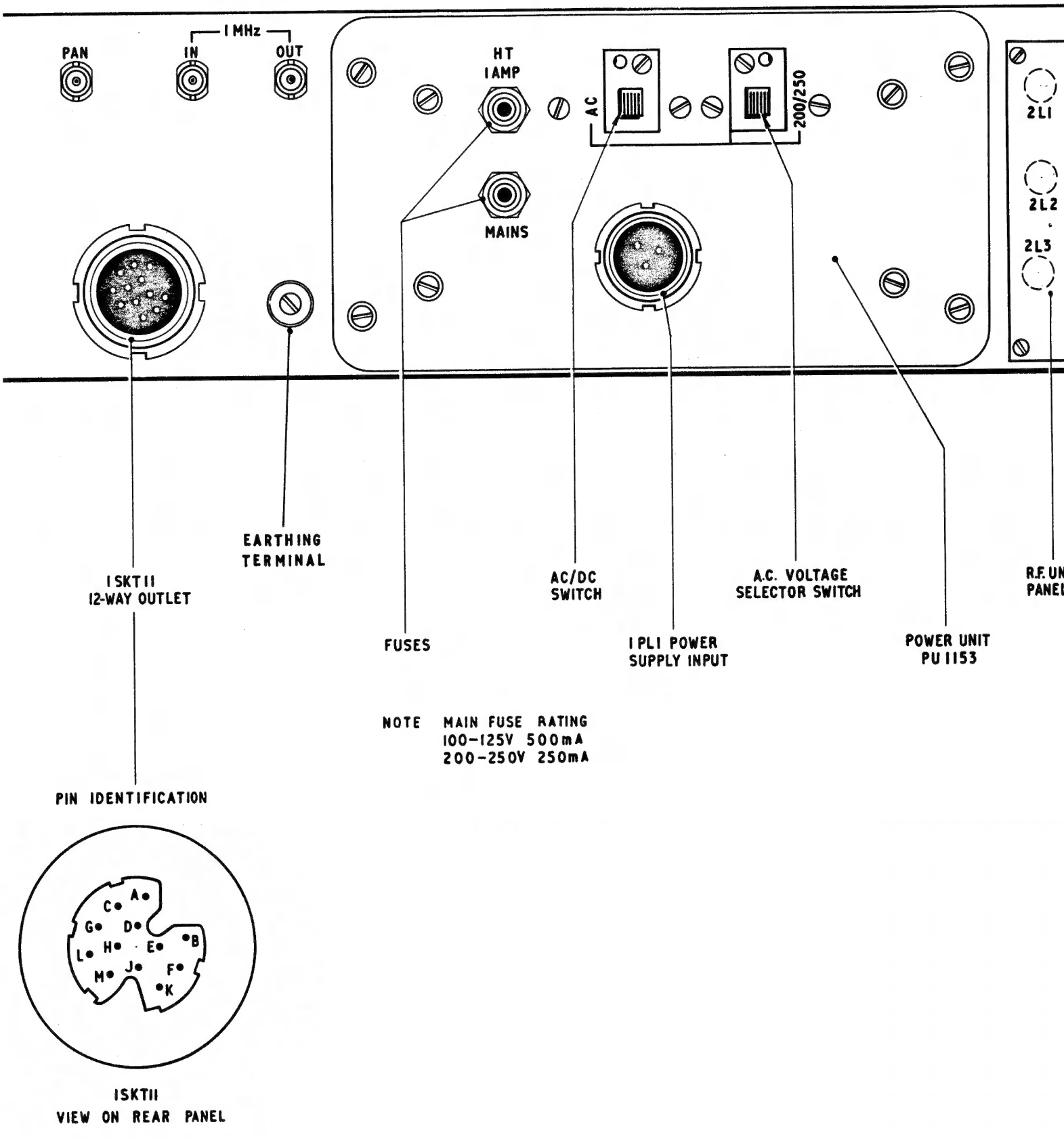
1 FL5 OUT TO SA3F4
2 FL5 IN TO SA1R4
3 FL2 OUT TO SA3F1
4 FL2 IN TO SA1R1
5 FL1 OUT TO 1st I.F. INPUT
6 SA3R TO I.F. MODULE PL3/SKT4
7 FL3 OUT TO SA3F2
8 FL3 IN TO SA1R2
9 FL4 OUT TO SA3F3
10 FL4 IN TO SA1R3
11 1st I.F. 100.a. TO SA3F5
12 1st I.F. 1000.a. TO SA1F1

VIEW ON ARROW 'A'

Chassis Layouts: RA 1217

Fig. 18


TERMINAL BLOCK TBI
2nd VFO
IN
OUT
LF
PAN
IN
1·6 MHz OUT
100KHz OUT
1·7MHz IN/OUT
HT. RF.
HT. LF.
AGC. RF.
AGC. LF
DET
1·6 MHz OUT
455KHz OUT
1·145MHz IN/OUT
HT. RF.
HT. LF.
AGC. RF.
AGC. LF.
DET
ALTERNATIVE I.F. PANELS
I SKT II 12-WAY OUTLET
PIN IDENTIFICATION
A
B
C
D
E
F
G
H
J
K
L
M
I SKT II
VIEW ON REAR PAN

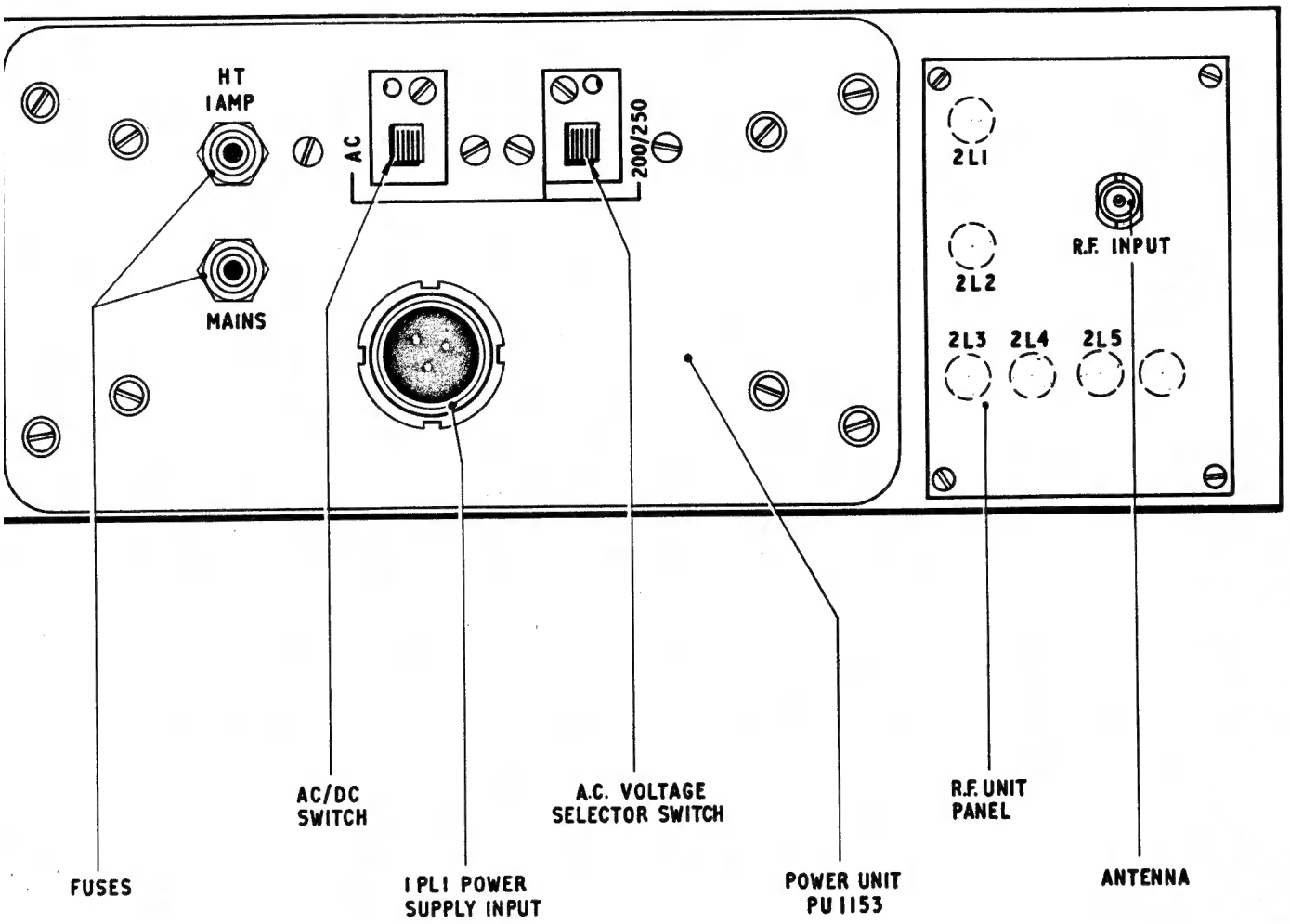


NOTE MAIN FUSE RATING
100–125V 500mA
200–250V 250mA

PIN IDENTIFICATION

1SKT11
VIEW ON REAR PANEL

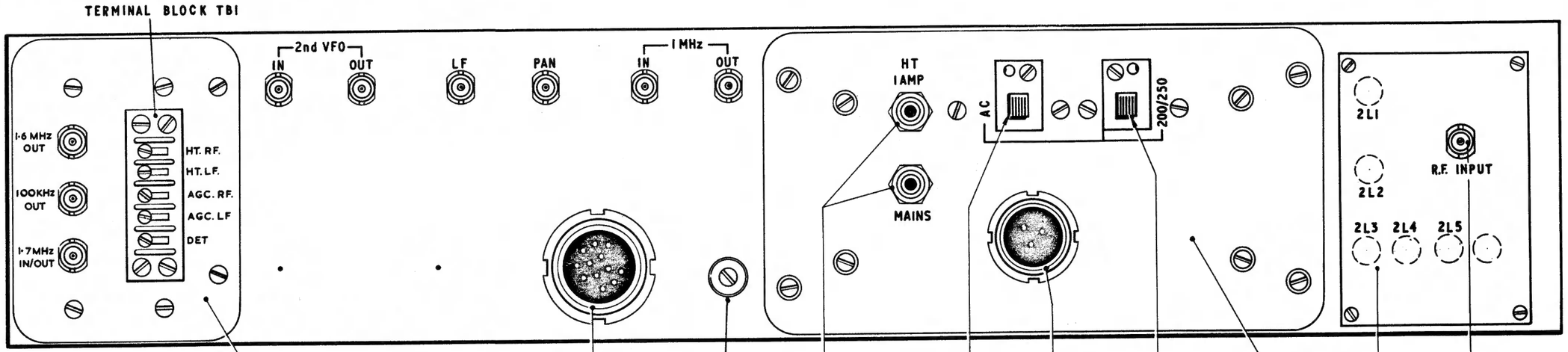
Rear Panel. RA1217



NOTE MAIN FUSE RATING
100–125V 500mA
200–250V 250mA

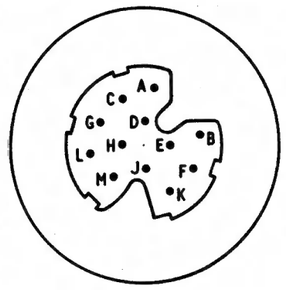
anel. RA1217

Fig. 19



NOTE MAIN FUSE RATING
100–125V 500mA
200–250V 250mA

PIN IDENTIFICATION



1SKT11
VIEW ON REAR PANEL

281/19

Rear Panel. RA1217

Fig. 19